1. What is meant by cell?

The brasic living unit of the body is cell. The function of organs and other structure of the body is understood by cell organization.

2. Give the abbreviation form for RNA, DNA?

RNA –Ribo Nucleic Acid DNA—De- Oxy Nucleic Acid

3. What are resting and action potential, bio electric potential?

The membrane potential caused by the different concentration of ions is called resting potential. It is caused by very rapid change of membrane permeability to sodium ions followed by recovery period.

The positive potential of the cell membrane during excitation is called action potential. Certain systems of the body generate their own monitoring signals conveying useful information about the functions they represent. Such signals are bio electric potentials and are related to nerve conduction, brain activity, heart beat etc.

4. What is meant by measurement?

Measurement is an act or the result of comparison between the quantity and a predefined standard.

5. Mention the basic requirements of measurement.

The standard used for comparison purpose must be accurately defined and should be commonly accepted.

The apparatus used and the method adopted must be provable.

6. What are the 2 methods for measurement?

1.Direct method and

2. Indirect method.

7. Explain the function of measurement system.

The measurement system consists of a transuding element which converts the quantity to be measured in an analogous form the analogous signal is then processed by some intermediate means and is then fed to the end device which presents the results of the measurement.

8. Define Instrument.

Instrument is defined as a device for determining the value or magnitude of a quantity or variable.

9. List the types of instruments?

The 3 types of instruments are

Mechanical Instruments

Electrical Instruments and

Electronic Instruments.

10. Classify instruments.

Absolute Instruments

Secondary Instruments

11. What are the 2 modes of operation of secondary Instruments?

Analog mode and

Digital mode

12. What are analog devices?

Signals that vary in a continuous fashion and take on infinity of values in any range are called analog signals. The devices that produce these signals are called analog devices

13. What are digital devices?

Signals that vary in discrete steps and thus take on only finite different values in a given range are called digital signals. The devices that produces these signals are called digital devices.

14. Mention the functions performed by the measurement system.

Indicating function

Recording function

Controlling function.

15. Give the applications of measurement systems.

The instruments and measurement systems are sued for

Monitoring of processes and operations.

Control of process and operations.

Experimental engineering analysis.

16. List the functional elements of the measurement systems.

Primary sensing element.

Variable conversion element and

Data processing element.

17. What is signal conditioning?

The performing of non-linear processes like modulation, detection, sampling, filtering, chopping and clipping etc. on the signal to bring it to desired form is called signal conditioning.

18. What is data transmission element?

When the elements of an instrument are actually physically separated, it becomes necessary to transmit data from one to another. The element that performs this function is called a data transmission element.

19. Give the function of the variable manipulation element.

The function of the variable manipulation element is to manipulate the signal presented to it preserving the original nature of the signal.

20. What are the characteristics of the measurement system?

Static characteristics

Dynamic characteristics

21. Why calibration of instrument is important?

The calibration of all instruments is important since it affords the opportunity to check the instrument against a known standard and subsequently to errors in accuracy.

22. Explain the calibration procedure.

Calibration procedure involves a comparison of the particular instrument with either.

A primary standard

A secondary standard with a higher accuracy than the instrument to be calibrated or

An instrument of known accuracy.

23. What are the static characteristics?

Accuracy

Sensitivity

Reproducibility

Drift

Static error and

Dead zone.

24. Define true value?

True value of a quantity to be measured is defined as the average of an infinite number of measured values when the average deviation to the various contributing factors tends to zero.

25. Define scale range.

The scale range of an instrument is defined as the difference between the largest and smallest reading of the instrument.

26. What is meant by reproducibility?

Reproducibility is the degree of closeness with which a given value may be repeatedly measured. It may be specified in turns of units for a given period of time.

27. Define repeatability?

Repeatability is defined as the variation of scale reading and is random in nature.

28. Define noise.

Noise is defined as any signal that does not convey any useful information.

29. What is accuracy?

Accuracy is the closeness with which an instrument reading approaches the true value of the quantity being measured.

30. What is precision?

Precision is measure of the reproducibility of the measurements, i.e. given a fixed value of a quantity; it is a measure of the degree of agreement within a group of measurements.

31. Mention the characteristics of precision.

Conformity and

Number of significant figures.

32.What is meant by Resting Potential?

Equilibrium is reached with a potential difference across the membrane such that negative on inside and positive on outside. This membrane potential caused by the different concentration of irons is called Resting Potential.

33.What is meant by Action Potential?

Cell has a slightly positive potential on the inside due to imbalance of potassium ions. This positive potential of the cell membrane during excitation is called Action Potential and is about 20 mV.

34.Give any 4 factors to be considered when we design any medical Instrument?

Accuracy, Frequency Response, Linearity, S/N ratio, Stability, sensitivity

35.What is Electrode Potential?

The voltage developed at an electrode-electrolyte interface is known as Electrode Potential.

36.What is the purpose of electrode paste?

The electrode paste decreases the impedence of the contact the artifacts resulting from the movement of the electrode or patient.

37.Give the different types of electrodes?

Microelectrodes, Depth and needle electrodes, Surface electrodes

38.Give the different types of Surface electrodes?

Metal Plate electrodes
Suction cup electrodes
Adhesive tape electrodes
Multi point electrodes
Floating electrodes

39.What is a Defibrillator?

A defibrillator is an electronic device that creates a sustained myocardial depolarization of a patient s heart in order to stop ventricular fibrillation or artial fibrillation.

40.What are the characteristics of a DC amplifier?

It may need balanced differential inputs giving a high common mode rejection ratio (CMRR).
It should have an extremely good thermal and long term stability.

41. Enumerate the merits and demerits of a dc amplifier?

It is easy to calibrate at low frequencies.
It is able to recover from an overload condition unlike it's AC counterpart.

42.Give the purpose of bridge circuits. What are the different types?

The bridge circuits are used in instrumentation systems for the measurement of resistance , inductance and capacitance.

Types:

DC type and
AC type.

43.What are the 2 types of wheatstone bridge?

Null type bridge
Deflection type bridge.

44.What are the different types of AC bridges?

AC bridge using push-pull transducers
AC bridge with push-pull inductive transducers
Inductive transducer Blumlein Bridge
Capacitive transducer Blumlein Bridge

45.Define slew rate

Slew rate is defined as the maximum output voltage change per unit time.

46.List the requirements of an instrumentation amplifier

Low drift
High i/p impedance
High linearity
High CMRR
High noise rejection capability

47.Give few applications of instrumentation amplifier.

The instrumentation amplifier finds increasing application in the amplification of the output signals obtained from thermocouples, strain gauge bridge and biological electrode.

48.What is a filter?

A filter is often a frequency selective circuit that passes a specified band of frequencies and blocks or attenuated signal of frequencies outside this band.

49.List the different types of filters.

Analog or digital filters
Passive or active filters
Audio (AF) or radio (RF) filters.

50.Specify the advantages of an active filter

Gain and frequency adjustment flexibility
No loading problem
Low cost

51.What is frequency scaling?

The procedure of converting a cutoff frequency to a new cutoff frequency is called frequency scaling.

52.What is quality factor?

The ratio of resonant frequency to bandwidth is known as the quality factor Q.

53.What is acquisition time of S/H circuit?

Acquisition time is the time required for the capacitor to charge up to the value of the input voltage after the switch is first started.

54.What is aperture time of S/H circuit?

The aperture time is the time required for the switch to change from ON state to OFF state.

55.List the components of a magnetic tape recorder?

Recording head
Magnetic tape
Reproducing head
Tape transport mechanism
Conditioning devices.

56.Mention the different methods of magnetic tape recording.

Direct recording
Frequency modulation (FM) recording and
Pulse duration modulation (PM) recording.

57.What is the purpose of erase head?

In the erase head, a signal of high frequency and level sweeps the magnetc

tape thereby completely wiping out the information contained there in. this render the magnetic tape to be used fresh for smother signal.

58.What is drop out?

In direct recording, some portions of the tape may not be perfectly recorded owing to dirt or poor manufacturer and this is called drop out.

59.Mention the 2 factors in FM recording

Percentage deviation and

Deviation ratio

60.What is the operation of a serial printer?

The serial printer produces a single character at a time, usually moving from left to right across a page. It prints 200 characters per second.

61.Mention the purpose of line printers.

The line printers are used to print and entire line simultaneously. It points 4000 lines per minute.

62.Give the operation of pare printers.

The page printer prints in a line at a time mode, but can be stopped and restarted only on the page basis. The top speed is 45,000 lines per minute.

63.List the classification of printers.

Impact and non-impact printers.

Fully formed character and dot matrix character printer.

Character at a time and a line at a time.

64.What is daisy wheel printer?

Daisy wheel printer is a fully formed character printer, designed for computer usage and has characters mounted on the periphery of a spinning print head similar to a daisy flow. They are capable of bi-directional printing.

65.Give short notes on dot-matrix printers.

In dot-matrix printers, the characters are formed by printing a group of dots to form a letter, no. or other symbols. It can print any combination of dots with all available print position in the matrix.

66.List the important features of CRTs.

Size

Phosphor

Operating voltages

Deflection voltages

Viewing screen .

67.What is meant by deflection sensitivity in CRT?

The deflection sensitivity of the CRT is usually stated as the DC voltage required for each cm of deflection of the spot on the screen.

68.What is meant by recurrent sweep in CRT?

When the saw tooth, being an AC voltage alternates rapidly, the display occurs respectively, so that a lasting image is seen by the eye. This repeated operation is known as recurrent sweep.

69.Mention the methods that are used for generating the 2 electron beams within the CRT.

The methods that are used for generating the 2 electron beams within the CRT are the double gun tube and split beam method.

70.Explain CRO and its function.

Cathode Ray Oscilloscope (CRO) is a very careful and versatile laboratory instrument used for display measurement and analysis of waveforms and other phenomena in electrical and electronic circuits. CRO is in fact a very fast X-Y plotter displaying an input signal versus another signal or time.

71.Name the components of a CRO.

CRO consists of a cathode ray tube (CRT) along with electron gun assembly, deflection plate assembly, fluorescent screen, glass envelope and base.

72.What is an electron gun?

The source of focused and accelerated electron beam is the electron gun. The electron gun which emits electrons and forms them into a beam consists of a heater, a cathode, a grid a pre-accelerating anode, a focusing anode and an accelerating anode.

73.Name the basic circuitry of CRO.

Vertical (Y) deflection system
Horizontal (X) deflection system
Synchronization
Blanking circuit
Intensity (z-axis) modulation
Positioning controls
Focus control
Intensity control
Calibration control
Astigmatism.

74.What is LED?

The LED is basically a semiconductor PN junction diode capable of emitting electromagnetic radiation under forward conductions.

75,Compare common anode and common cathode displays.

Common anode type display require an active low (or current linking) configuration for code converter circuitry, whereas an active high output circuit is necessary for common cathode LED type display.

76.List the characteristics of LCD.

Light scattering
Can operate in reflective or Transmissive configuration.
Do not actively generate light and depend for their operation on ambient or back light.

77.On what does the operation of LCD depend?

The utilization of a class of organic materials which remain a regular crystal like structure even when they have melted.

78.Name the 2 commonly available types of LCDs.

Dynamic scattering and
Field effect type.

79.What is the purpose of dot matrix displays?

Excellent alphanumeric characters can be displayed by using dot matrix LEDs with an LED at each dot location.

80.What are the commonly used dot matrices for the display of characters?

The commonly used dot matrices for the display of prominent characters are 5 x 7, 5 x 8 and 7 x 9.

81.What are the 2 writing patterns of dot matrix displays?

Common anode or common cathode connection (uneconomical)
X-Y array connection (economical and can be extended vertically or horizontally using a minimum number of wires)

82. Define transducers.

Transducers are defined as a device which when actuated, transforms energy from one form to another. Generally, any physical parameters is converted into electrical form.

83.What are the 2 types of transducers?

Electrical and
Mechanical

84.Name the parameters that dictate the transducer capability

Linearity
Repeatability
Resolution and
Reliability

85.Define sensitivity

Sensitivity is defines as the electrical output per unit change in the physical parameter. High sensitivity is generally desirable for a transducer.

86.Classify electrical transducers.

Active
Passive

87.Name the 2 parts of a transducer

Sensing element
Transduction element

88.Mention the factors considered while selecting a transducer.

Operating range
Sensitivity
Frequency response & resonant frequency
Environmental compatibility
Minimum sensitivity
Accuracy
Usage and ruggedness
Electrical parameters

89.What is meant by POT?

POT is a resistive potentiometer used for the purpose of voltage division. It consists for a resistive element provided with a sliding contact called as wiper.

90.Explain the working principle of a strain gauge.

Strain gauge works on the principal that the resistance of a conductor or a semiconductor changes when strained. This property can be used for

measurement of displacement, force and pressure.

91.Name the different types of strain gauges.

Un-bonded metal strain gauge
Bonded metal wire strain gauge
Bonded metal foil strain gauge
Vacuum deposited thin metal film strain gauge
Sputter deposited thin metal strain gauge
Bonded semiconductor strain gauge
Diffused metal strain gauge

92.What is meant by rosette?

It is a combination of strain gauges to a single element strain gauge.

93.Give the 3 working principles of variable inductance transducers

Change of self inductance
Change of mutual inductance
Production of eddy currents.

94.Write notes on LVDT

It is the linear variable differential transformer which is used to translate the linear motion into electrical signals. It consists of a single primary winding and 2 secondary winding.

95.List the advantages of LVDT

High range of displacement measurement
Friction & electrical isolation
Immunity from external effects
High I/p and high sensitivity
Ruggedness
Low hysterisis & low power consumption.

96.What is a digitizer?

It is a digital encoding transducer that enables a linear or rotary displacement to be directly converted into digital form without intermediate forms of analog to digital (A/D) conversion.

97. Classify the pacemakers

Fixed rate pacemakers.
Ventricular Synchronous pacemakers
Demand pacemakers
Atrial Synchronous pacemakers

98. Different methods of stimulation

External stimulation,Internal stimulation

99.Define electrode , what are the type of electrodes.

Devices that convert ionic potentials into electronic potentials are called electrodes. There are three types of electrodes, They are

Micro electrode
Depth and needle electrode
Surface and needle electrode

100. What is electrode potential (or) half – cell potential?

The interface of metallic ions solution with their associated metals result in an electrode potential.

101. What are the characteristics of resting potential?

The value of potential is maintained as constant.
It depends on temperature.
Permeability varies

102. Define the process of sodium pump.

It is an active process, called a sodium pump in which the sodium ions are quickly transported to the outside of the cell & the cell again becomes polarized and assumes its resting potential.

103. Define neuron, nerve fibers.

The basic Units of the nervous system is the neuron. A bundle of individual nerve fibers is called a nerve .A neuron is a single cell with a cell body, called soma, one or more inputs fibers called dendrites and a long transmitting fiber called axon. Both axons and dendrites are called nerve fibers.

104. What are parts of central nervous system?

It consists of 10^{10} neurons. The brain consists of cerebrum, cerebellum and brainstem. Cerebrum consists of two hemispheres and there are divided into frontal lobe, occipital lobe and temporal lobe. Cerebellum consists of two hemispheres. They regulated the coordination of muscular movements.

105. Name the pars that contain peripheral nervous system.

The neve fibers outside the central nervous system called peripheral nerves. It consists of motor and sensory nerves.

106. Define circulatory system

it is a type of transport system. It helps in supplying the oxygen and digested food to different parts of our body and removing CO_2 from the blood. The heart is the center of the circulatory system.

107.Define heart, lung?

Heart is a pumping organ which eats regularly and continuously for years. It beats seventy times a minute at rest. Contraction is systole and relaxation is diastole.

108.Define circulation and respiration?

We can define from the engineering point of view, the circulation is a high resistance circuit with a large pressure gradient between the arteries and veins
The exchange of any gases in any biological process is termed as respiration

109.What is mean by transducer?

It is a device which detects or senses the bio signal and converts it in to an electrical signal for bio signal processing

110.Define strain gauge?

It is a electrical device which is used to measure stress or pressure in terms of strain using the principle of change of resistively due to mechanical stress

111.How are transducer are classified?

They can be classified into different types based on the energy conversion, application and so on. They are two types

Active transducer: A transducer that gives its output without the use of an excitation voltage or modulation of a carrier signal is called an active transducer

Passive transducer: A transducer that gives its output using an excitation voltage or modulation of a carrier signal is called a passive transducer. Generally the active transducer converts a non- electrical energy into electrical energy and converts an electrical into non –electrical energy.