**DEPT OF ECE**

**QUESTION BANK**

**YEAR/SEM: III / 06**

 **EC2021- MEDICAL ELECTRONICS**

**UNIT - 1**

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 â€“Ribo Nucleic Acid DNAâ€”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. 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.

10. 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.

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

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

12. What is Electrode Potential?

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

13. 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.

14. Give the different types of electrodes?

Microelectrodes, Depth and needle electrodes, Surface electrodes

15. What is PH electrode?

The chemical balance of human body is identified by measurement of Ph content of blood and other body fluids. PH is defined as logarithm of reciprocal of hydrogen ion concentration.

16. Define polarized and non poloaraised electrode.

Electrrodes in which no net transfer of charge occurs across the metal electrolyte interface is called as perfectly polaraised electrodes. Electrodes in which un hindered exchange of charge occurs across the metal electrode interface is called perfectly non polaraisable electrodes.

17. What is plethysmograph?

The instrument used for measuring blood volume is called plethysmograph.

18. Define All or nothing law.

All or nothing law states that regardless of the method of excitation of cells or by the intensity of the stimulus, the action potential is same for any given cell.

19. What is absolute refractory period?

It is the time duration in which cell cannot respond to any new stimulus. Generally it is about 1ms in nerve cell.

20. What is Relative refractory Period.

It is one during which another action potential can be triggered but a higher stimulus is required to reinitiate the action potentialand the subsequent contraction of muscles . generally the relative refractory period is several millisecond.

21. Define Conduction Velocity.

The rate at which an action potential moves down a fibre or propagated from cell to cell is termed as propagation rate.

 **UNIT - 2**

1. Mention various types of chemical electrodes.

Hydrogen electrode, ph electrode, po2 electrode, pco2 lectrode.

2. 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

3. 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

4. What is electrophoresis?

Electrophoresis is a technique used to separate biological molecules, such as nucleic acids, carbohydrates, and amino acids, based on their movement due to the influence of a direct electric current in a buffered solution. Positively charged molecules move toward the negative electrode, while negatively charged molecules move toward the positive electrode.

5. What is the use of blood flowmeter in bio medical instrumentation?

Blood flow meters are used to monitor the blood flow in various blood vessels and it also helps to measure cardiac output.

6. What are the different types of blood flow meters?

Electromagnetic blood flow meter, Ultrasonic blood flow meter, Laser Doppler Blood flow meter, NMR Blood flow meter.

7. Give some applications of electromagnetic blood flow meters.

Blood flow measurements during cardiac surgery, blood flow measurements during shunt operations, blood flow measurements during carotid artery, blood flow measurements in rural arteries, blood flow measurements during organ transplantation.

8. What is cardiac output?

Cardiac output is the quantity of blood delivered by the heart to the aorta per minutes. It is a major determinant of oxygen delivery to the tissues.

9. What happens when there is a fall in cardiac output?

A fall in cardiac output may result in low blood pressure, reduces tissues oxygenation, acidosis, poor renal function and shock.

10. What are the different types of dilution methods?

Indicator dilution method, Dye dilution method, Thermal dilution method.

11. How Cardiac output is measured in thermal dilution method?

A thermal indicator of known volume introduced into either the right or left atrium Will produce a resultant temperature change in the pulmonary artery or in the aorta respectively, the integral of which is inversely proportional to the cardiac output. Cardiac output=a constant X(blood temp-injectate temp)/area under dilution curve.

12. What is the use of blood flow meter in bio medical instrumentation?

Blood flow meters are used to monitor the blood flow in various blood vessels and it also helps to measure cardiac output.

13. What are the two different principles used in ultrasonic blood flow measurement?

Transit Time method: In this method, a peizo electric crystal emits a brief pulse of ultrasound which propagates diagonally across the blood vessel. Doppler effect based method: In this method , as per Doppler effect, there is a change in frequency of reflected ultrasonic wave, due to motion of blood , when it crosses blood.

14. Define transit time principle of ultrasonic blood flow meter.

In Transit time method a piezo electric crystal emits a brief pulse of ultrasound which propagates diagonally across the blood vessel. The pulse reaches a receiving crystal situated on the opposite side wall of the blood vessel. Electronic circuitry attached externally interprets transit time to velocity.

15. What is Sphygmomanometer?

Sphygmomanometer is a dvice used by the physician to measure blood pressure. It is used for indirect BP measurement and it consists of inflatable rubber bladder called the cuff, a rubber squeeze ball pump and value assembly and a manometer.

16. What is BSR?

BSR means based skin response, which gives the baseline value of skin resistance.

17. What is GSR?

GSR means galvanic skin response, which gives the measure of average activity of the sweat glands and is a measure of phasic activity of sweat glands.

18. What is plethysmograph?

Plethysmograph is used to measure the constant volume changes or constant pressure changes in the chamber.

19. What is korotkoff sound?

In the BP measurement, When the systolic pressure exceeds the cuff pressure, then the doctor can hear some crashing , snapping sound through the stethoscope. This is known as korotkoff sound.

20. What is cardiac output?

Cardiac output is the amount of blood delivered by heart to the aorota per minute.

 **UNIT - 3**

1. 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 CO2 from the blood. The heart is the center of the circulatory system.

2. 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.

3. Define circulation and respiration?

We can define from the engineering point of view, the circulation is a high resistance circuit with a large pressure.

4. Different methods of stimulation External stimulation,Internal stimulation

5. 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.

6. 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.

7. 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 itâ€™s AC counterpart.

8. 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.

9. What are the 2 types of wheatstone bridge? Null type bridge Deflection type bridge.

10. Define slew rate

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

11. 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.

12. 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.

13. Specify the advantages of an active filter

Gain and frequency adjustment flexibility No loading problem Low cost

14. What is frequency scaling?

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

15. What is quality factor?

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

16. 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.

17. 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.

18. 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.

19. 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.

20. Mention the 2 factors in FM recording Percentage deviation and Deviation ratio

 **UNIT - 4**

1. 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.

2. 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.

3. 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.

4. 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.

5. 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.

6. 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.

7. 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.

 **UNIT - 5**

1. What is LED?

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

2. 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.

3. 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.

4. 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.

5. Name the 2 commonly available types of LCDs. Dynamic scattering and Field effect type.

6. 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.

7. 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.

8. 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)

. 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.

10. What are the 2 types of transducers? Electrical and Mechanical

11. Define sensitivity

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

2. Classify electrical transducers. Active ,Passive

13. Name the 2 parts of a transducer Sensing element Transduction element

14. 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.

15. 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.

16. What is meant by rosette?

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

17. Give the 3 working principles of variable inductance transducers

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

18. 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. 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.

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21. 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

22. 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