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Experiment No.1
Measurement of heart beat rate by ECG Machine.

Aim: Measurement of heart beat rate by ECG Machine.

Apparatus: ECG Machine and probes, Jelly. ECG paper

Theory:

The Electrocardiogram (ECG)

The bio-potentials generated by muscles of heart result in the electrocardiogram. Each action potential in the heart originates near the top of the right atrium as a pain called the pacemaker.

The pacemaker is a group of specialized cell that spontaneously generate the action potential as regular rate although the rate of controlled by innervations. To initiate the heart beat the action potential generated by the pacemaker propagates in all direction along the surface of both atria and ventricles. The wave terminates at a point near the center of heart action ventricular. At the point some special fibre acts as a delay line to provide proper lining between the actions of the atria. Once the electrical potential passes through the delay line, it is rapidly spread all part of both ventricles.

P represents depolarization of atria musculature. The QRS is the combine result of depolarization of atria T wave is ventricular repolarisation and U wave is result of after potential in triangle. The sides of triangle represent lines along which 3 projections of ECG Vector are measured.

Unipolar Leads (V leads)

The standard leads seconds the difference electrical potential between two points on body produced by heart action moreover of electrodes is placed on the chest close to heart higher potential can be selected than normally available at limbs. The ECG is recorded between the terminals which has potential corresponding to center of body.

i. Limb Leads
ii. Pericardial Limbs

1. Limb Leads:-

The two limb leads are tied together and recorded with the third limb lead known as AVR, right arm is recorded with respect to reference established by jointly left are arm is recording w.r.t. common junction of right arm and left leg. In AVR lead. The left leg is recorded w.r,t, the two arm electrodes tied.

2. Pericardial Leads:-

The second type of unipolar and lead is pericardial lead. It employes can exploring electrode to record the potential of the heart action on the chest at six different positions. These leads to designate by V in the ventricular muscle.

The ECG Leads:-

Two electrodes placed over difference are as of the heart and connected to the galvanometer will pick up the electrical currents resulting tracking of voltage difference at any two sites due to electrical activity.

Bipolar Leads:-

In bipolar leads ECG recorded by using tow electrodes such that final trace corresponds to difference of electric potentials exciting between them.

In standard lead I the electrodes are placed on the eight the left arm CRA and LA. In II the electrodes are placed on Ra and left leg. In all lead connections the difference of potential measured between two electrodes.

Einthoven postulated that at any given instant of cardiac cycles. Electrical axis of heart can be represented as two dimensional vector. He proposed that electrical field of heart could be represented diagrammatically as triangle with heart. 3 projections of ECG vector are measured.

Procedure:-

1. Take ECG electrode to patient and apply some jelly on it.
2. Connect these electrodes to patient in lead position.
3. Switch on ECG machine so that it could record heart potential an heart secretive paper.
4. Take reading for other combination.

Conclusion:-

In this experiment we studied the potential of heart in different position and how to get on ECG from these potentials.

Experiment No.2
To Study of Cardiac Arrhythmia

Aim: To Study of Cardiac Arrhythmia

Theory:

Cardiac is the term for only of a large and heterogeneous group of condition in which there is abnormal electrical activity in heart.

The term ósinus arrhythmiaô reeferôs to normal phenomenon of mid acceleration and slowing of heart that occurs breathing in and out.

Classification of common cardiac arrhythmic as,

iii. Arterial
iv. Functional Arrhythmias
v. Ventricular
vi. Heart block

Broadly divided as

5. Brady cardiac
6. Tachy cardiac
7. Automaticity
8. RC entry
9. Fibrillation
10. Triggered beats

Rhythm # 1 (sinus Brady cardiac) :-

Rate	30bpm
Regularity	Regular
P Wave	Normal
P R interval	0 ï 12 sec
QRS duration	0 -10 sec
Interpretation	Sinus Brady cardiac.

Deviation from :-

NSR rate < 60 bpm

Etiology :- SA node depolarizing slower than normal impulse is conducted normally.

Rhythm # 2 (Tachy cardiac) :-

Range	130bpm
Regularity	Regular
P Wave	Normal
PR interval	0 -16 sec
QRS duration	0 -08 sec

Deviation from:-

NSR rate> 100bpm.

Etiology:-

So node is depolarizing factor than normal impulse is conducted normally.

Rhythm # 3 (ventricular tachy cardiac) :-

Rate	100bpm
Regularity	Regular
P Wave	None
PR interval	None
QRS duration	Wide (70-120 sec)
Interpretation	Ventricular tachy cardiac

Deviation from NSR:-

Impulse is originating in ventricle (no. P waves, wide QRS)

Etiology:-

There is a reentrant pat way looping in a ventricle (most common cause) Ventricular tachycardia can sometimes generate there cardiac o/p to produce a pulse at other times no pulses.

Rhythm # 34 (Normal ECG):-

Rate	60 bpm
Regularity	Regular
P wave	present
PR interval	120 msec
QRS duration	50 msec
Interpretation	Normal ECG

Rhythm # 5 (Atrial fibrillation):-

Rate	100 bpm
Regularity	irregularly, irregular
P wave	None
PR interval	None
QRS duration	0.065
Interpretation	Atrial fibrillation

Deviation from NSR:-

No organized atrial depolarization so on normal P waves. Atrial activity is chaotic common effects 4 -4 % up to 5 -10%.

Etiology:-

Recent theories suggest that it is due to multiple re-entrant P waves lets conducted between right & left atrial either wall impulse are termed in a totally un predictable fashion. The AV node allows some of impulse to pass there at variable intervals.

Rhythm # 6 (Atrial Flutter):-

Rate	70 bpm
Regularity	Regular
P wave	Flutter Wave
PR interval	None
QRS duration	0.06 sec
Interpretation	Atrial Flutter

Deviation from NSR:-

No P wave instead flutter wave are formed at to rate 250-350 only some impulses conduces there AV node.

Etiology:-

Re entrant pathway in right atrium with every 2, 3 & 4 impulse generating QRS.

Rhythm # 7 (paroxysmal super ventricular tachycardia's)

Rate	74 -148 bpm
Regularity	Regular
P- wave	None
PR interval	Not Present
QRS interval	0.08 sec
Interpretation	Paroxysmal super ventricular tachycardia

Deviation from NSR:-

The heart rate suddenly speed up often triggered by a PAC & the P wave are lose.

Etiology:-

There are several types of PSVS but all originates above the ventricles are most common abnormal conduction in the AV node (Re-entrant circuit looping in the AV node)

Rhythm # 8 (ventricular Fibrillation):-

Rate	None
Regularity	Irregularly irregular
P wave	None
PR interval	None
QRS duration	Wide if reorganization
Interpretation	ventricular fibrillation

Deviation from NSR:-

Completely form abnormal.

Etiology :-

The ventricular cells are excitable and depolarizing randomly. Rapid drop in cardio o/p and death occurs if not quickly reversed.

Rhythm # 9 (Premature Ventricular contraction):-

Rate	60bpm
Regularity	occasionally irregular
P waves	Non for 7^{th} QRS
PR interval	0-14 sec
Interpretation	0-085 (7^{th} wide)
QRS	0-085 (7^{th} wide)
Interpretation	sinus rhythm with 1 pvc

Deviation from NSR:-

Ectopic beats originate in ventricles which results in wide & QRS complexes. When there are more than one premature beat & look, thy are called uniform, when they look diff. they are called as multiform.

Etiology :-

One or more ventricular cells are depolarizing & impulses are abnormally conducting there ventricular.

Rhythm # 10 (Premature Atrial Contraction):-

Rate	70 bpm
Regularity	occasionally regular
P wave	217 diff. counter
PR wave	0-145 (except 217)
QRS interval	0.085
Interpretation	NSR with primitive atrial

Deviation from NSR:-

The ectropic beats originate in atria therefore count our of P wave. The PR interval timing are different than a normally generated pulse from SA Node.

Etiology :-

Excitation of atrial cell from an in the conducted normally there AV node & ventricles.

Conclusion:-

We have studied different types of arithrma which shows abnormal electrical activity of heart.

Experiment No.03
To Change Heart Rate of Implantable Pacemaker

Title :- To Change Heart Rate of Implantable Pacemaker

Aim :- To Change Heart Rate of Implantable Pacemaker

Theory :-

A device capable of generating artificial pacing impulses and delivering them to the heart is called as pacemaker System. It Consist of a pulse generator & appropriate electrodes.

External pacemakers are used on patients with temporary heart irregularities. The pacemaker usually consist of an externally worn pulse generator connected to electrodes located on or within the myocardium. They are also used to temporary ingint of certain arrhythmia.

Internal pacemaker may be permanently implanted in patients whose SA node have failed to P function properly or who suffer from permanent heart block diagram because of heart attack. It is implanted with the pulse generator place in a surgically formed pacemaker below the right or left sub cost all area. Internal lead connected to electrode that directly contact the inside of R.V or the surface of the myocardium.

Fig. Shows the block diagram showing component of the circulatory. The timing ckt.which consist of an RC network a reference vtg.source & comparator determines the basic pacing rate of the pulse generator. Itôs O/P slg. Feeds in to a second RC n/w. The otp slg feeds pulse width ckt. Which determines the stimulating pulse duration. A third RC N/W the rate limiting ckt.diable comparator for a present internal and thus limits the pacing rate to a maximum 120 pulse per minute for most single component failure. The o/p ckt.provides a vtg. Pulse to stimulate the heart the vtg.monitor ckt.senses cell depletion and slagôs the rute slow down 8±3 beat per minutes when cell depletion has occurred.

Programmable pacemaker :-

A programmable pacemaker consist of 2 parts. The external unit which generates programmed stimuli which is transferred to an interval unit by one of the several communication techniques. The commonly used ,method of transmitting information. are,

11. Magnetic
12. Radio- Frequency wave
13. Acoustic- Ultrasonic pressure wave From a suitable transducer

` The program contain a microprocessor based transmitter/Receiver that operates by inductively coded data from the programmer via the programming want the pulse generator. The programming information is contained in a 20-bit command coad specified the desired rate, pulse width, pulse amplitude, sensitivity level, mode of operation, pulse generator model identification coad and is not correct, the command is rejected by the pulse generator and no programming occurred.

Conclusion:-

Hence we have studied the heart rate of implantable pacemaker.

Experiment No.04
Title:- Blood Pressure Measurement

Aim: - Blood Pressure Measurement

Apparatus: - Automatic blood pressure monitor (AT-987m^{-1})

Theory:-

Blood is pumped by left side of heart into aorta, which supplies it to the arterial circuit due to the load resistance of the arteries and pre capillaries. It loose most of its pressure &returns to the heart of a low pressure via highly distensible veins. The right side of the heart pumps it to pulmonary circuit which operated at lower pressure. The heart supplies blood to both circuits as simultaneous intermittent flow pulses of variable rate and volume.

The maximum pressure reached during cardiac ejection is called systolic pressure and minimum pressure occurring at the end of ventricular relaxation is termed as diastolic pressure. The nominal values in the basic circulatory system are as follows.

Arterial	30-300 mmHg
Veins	5-15 mmHg
pulmonary	6-25 mmHg

There are two types of methods of blood pressure measurement.

vii. Direct method
viii. Indirect method

3. Direct Method :-

This system is used when continuous monitoring is required. A cathode or needle type probe is inserted there a vein or artery. The two types of probes can be used. One type catheter tip probe in which the sensor is mounted on the tip of the probe & pressure external on it are converted to pro. signal In the second type saline is injected and the pressure fluid filled column is measured.

Indirect Method:-

The complete cycle of measurement consist of just pumping controlled deflection picking up and evaluation of kortkoffôs sound fixing of the systolic and diastolic pressure and then complete deflection of the cuff.

This method consists of putting the cuff around the upper part of arm. The compressed required inflating the cuff is provided by pump. The pressure in the cuff is then decreased at a reality slow pace while is allowed reaks from cuff the kortcoff sound are picked up. The core electrical signal are get to pre amplifier. The system is so designed that when just kortcoff sound is detected that pressure is recorded as systolic pressure & the end kirtcoff sound diastolic pressure.

Procedure :-

14. Wrap cuff around upper arm of patient.
15. Press start.
16. Repeat diastolic and systolic pressure.
17. Also record pulse rate.

Conclusion :-

Thus we have measured the blood pressure.

Experiment No. 05
Study of Syringe Pump

Aim:- To Study of Syringe Pump

Apparatus:- Zeruom`s terufusion, Syringe pump.

Theory: -

Controlled and continuous intravenous delivery of common meditations such as ion tropic agents so dilator, a minopycline insulinôs hepa tin etc. via infusion pump is preferred. Mode of accurate care small babies of those with compro missed renal cardiac or pusmonary functions have limited fluid, tolerance and hence and hence it is essential to use infusion pump so as to prevent in adverent volume overload. The use of infusion pumpôs have been advocated over manual flow control on basis of assuming precise and accurately delivery of prescribed fluid volume over specified time and to help is better nursing management.

Infusion pumpôs may be gravity controlled, the displacement pump, syringe pump are the type of positive displacement pumps. It provides +Ve displacement of fluids with the help of motors. They are designed so as to prevent infusing of large volume of air or substances in filtration signification advance hhas been the introduction of calculations mode within pump so that clinical volume of air or can set weight of patlents drug contrition and infusion in pump then calculation the infusion in minute.

A jerumo company has manufactured IC 372 jerufusion pump which stacks pumps in same field of modulator multi infusion system.

The stack system combines both the advantages of stacking and rocking system. The function as prototypes were produced by laser for making final component. There parts of aluminum tooling allows producing low quantities of products.

Procedure :-

18. Switch on the power supply.
19. Adjust the flow rate and fill syringe with liquid medicine.
20. Place it in neat manners.
21. Set the flow rate according to requirement.
22. Press the start button.

Conclusion :-

Thus we have studied jerufusion syringe pump.

Experiment No. 06
Study infusion Pump

Aim:- To Study infusion Pump

Requirement:- Infusion Pump instrument

Theory:-

An infusion pump infuses, medication or nutrients into patients circulatory system. It is generally used to intravenously although subcutaneous arterial & equivalent infusion are occasionally used. Infusion pumps can administer fluid in way that would be impractically expensive or unreliable if performed manually by nursing staff for eg. They can administer as little as 0.1 ml /hr. injection every minute, injection with repeated boluses required requested by patients up to maximum number per hour or fluid whose volumes vary by time of day because they can also produce quite high but controlled pressure. They can inject control amount of fluids subcutaneously or epidurally

Types of Pump:-

There are two basic classes of pump can pump nutrients solutions enough to feed a patient, small volume [ump in fuse hormones such as insulin or other medicine such as oplater.

Large volume pumps usually use some from peristaltic pump. Classically, they use computer controlled rollers compressing a sirubber tube through which medicine flows small volume pump usually use computer controlled motor turning screw that pushes plunger on syringe. Some of the smallest infusion pump use asmatic power basically a bag or salt solution absorbs water through membrane swelling its volume.

The bus pressure medicine out. The rate is precisely controlled by self concentration & pump volume asmatic pumps are usually recharged with syringe.

Procedure :-

23. Switch on power supply.
24. Select appropriate mode.
25. Adjust flow rate.
26. Press start button.
27. Observe drop rate.

Conclusion :-

Thus we have studied the infusion pump.

Experiment No. 07
To Study DEM-QS1 Ultrasonic Doppler

Aim:- To Study DEM-QS1 ultrasonic Doppler

Equipments:- DEM-QS1 ultrasonic Doppler instrument.

Theory:-

Principle of Operation:-

The instrument works on the principle of Doppler effect. Very low ultrasonic frequency (2MHz) is beamed in to body from a probe. Ti is reflected back from organs & blood particles frequency of reflected signals is changed slightly due to movement of petal heart blood particles & other moving organs reflected signal received by the instrument is amplifier and processed electronically to get audible signal there built in speaker or external earphone.

Specifications:-

Operating probe frequency 2MHz for obstetric & gynecological applications facility for earphone & tape recording operates on 6 day cell every day 1050 type or can be operated on mains supply with main adapter.
Length = 216 mm
Height = 95 mm
Depth = 210 mm
Weight -1906

Procedure :-

28. Turn the volume control knob in anti-clockwise direction to end position.
29. Adjust volume control to its centre position.
30. Apply olive oil / K.Y Jelly on the area of inspection.
31. Scan the probe slowly in various direction to get the sound.

Conclusion :-

Thus we have studied DEM- QS1 ultrasonic Doppler instrument.

Experiment No.08

To Study Defibrillator's & Defibrillation Operations.

Aim:- To Study Defibrillatorôs & Defibrillation operations.

Apparatus:- Defibrillator, Defibrillator tester.

Theory:-

Ventricular fibrillation is a serious cardiac energy resucting from a synchronous contraction of heart muscles. Ventricular fibrillation can be converted in to a more efficient rhythm by applying a high energy shock to the heart. The sudden shock across the heart causes all muscles fibers to the heart causes all muscles fibers to contract simultaneously possibilities all fibers may than respond to normal physiological pacemaker pulses. The instruments for administrating shock is called as defibrillator.

Defibrillator's are of two types

32. External Defibrillations:-

Where shock is delivered by keeping electrodes on the chest of patient.

33. Internal Defibrillations:-

Where electrodes are help directly against the heart while chest is open.

DC Defibrillators :-

Almost all DC defibrillators use an energy storage capacitor which is charged at a slower pace (ms) from the AC line by means of a step up transformer and rectifier arrangement . during defibrillation the stored energy in capacitor is then delivered as a relatively rapid rate (ms) to the chest of patient.

For effective defibrillation it is advantageous to adopt some shaping of the discharge cnt. Pulses. The simplest arrangement involves the discharge of capacitor energy through the persons own resistance. This fields exponentials discharge typically of an RC ckt rectangular & trapezoidal w/f if also have been found to be effective in defibrillator designed for clinical use. In the diagram of a variable auto transformer T1 forms the primary of a high voltage transformer ,T2. The o/p voltage of transformer is rectified by a diode rectifier & is connected to a vaccum tube high voltage transformer T2. The o/p voltage of transformer is rectified by a diode rectifier and is connected to a vaccum tube high voltage change over switch. In position A, the switch is connected to one end of a oil filled 16 µf capacitor. In this position charge to voltage set by the positioning of the auto transformer A fool switch or switch button is mounted on the bundle of electrode. The capacitor discharge across the heart there electrodes.

DC Defibrillator with Synchronous:-

For termination of ventricular relaxation fibrillation a dc defibrillator is used. But for termination of ventricular tachycardia artarial fibrillation and other asthmas it is essential to used a defibrillator wit Synchronous ckt.

At defibrillation of heart in atrial fibriation the shock may bring the ventricles into fibrillation. There is however a period in the heart cycle where the danger is least defibrillation must takes place in that heart period. This is called cardio-version in this the application of shock pulse during the vulnerable T wave is avoided otherwise there is like hood of providing ventricular fibrillation.

Procedure :-

ix. Switch on the power supply.
x. Set the appropriate energy level and charge the capacitor.
xi. Note the maximum amplitude and charging time.
xii. Discharge by pressing the button on disc shaped electrode.
xiii. Note down the discharge time and calculate the energy level.
xiv. Repeat the procedure for various energy level.

Conclusion:

Thus we have studied defibrillator.

Experiment No.09
To Study Short Wave Diathermy

Aim: To study short wave diathermy

Apparatus: short wave diathermy (250w), electric pads.

Theory:

The term diathermy means through heating or producing deep heating directly in to the tissues of body externally applied across source of heat like towels, infrared lamps, electric heating pads often produce before adequate heat loss penetrated technique the subject body becomes a part of electrical circuit and the heat is produce within the body and heat transferred through the skin .

The advantage is that the treatment can be controlled Precisely by careful placement of the electrode permits Localization of heat to the region that has to be heated. The amount of the heat can be closed adjusted by means of circuits pacemaker the heating of tissues the carried out high Frequency a.c. which generally has the frequency of 27.12MHZand wavelength of 11m. Current of such high frequency

Do not simulate pacemaker like motors or sensory recovery nerve not to they produced any muscle contraction. Thus when a current is passed through the no discomfort is caused to the subject

The shortwave diathermy m/c consist of two main circuits. i.e is

i)Non oscillation circuits which produce high frequency current and

ii)Patient current that is connected to the oscillating circuit through which electrical energy is transferred to the patient from fig shows transformer T_1 , the primary of which can be energized from the main supply is a step of transformer for providing EHT.

For the anode of the triode value. A second winding can providing heating current is formed by the coil AB in parallel with condenser C_1. The positive feedback is generated by coil CD. There is another coil EF and variable condenser C_2 which forms the patients resonator ckt. due to its coupling with the oscillator coil AB.

The anode supply of such ckt is around 4000v. The contraction of conduction in the triode takes place during half cycle and high frequency is generated only during this period. The variable condenser C_2 is adjusted to achieve maximum reading on meter. The maximum power delivered by this m/c is 500w. There are several ways of regulating the intensity or current supply to the patient from short wave diathermy m/c.

This can be done by either

i)Controlling the anode vtg.

ii)Adjusting the filament heating current.

ii)Adjusting the grid bieu by change of grid

Change of grid leak resistance R_1 or automatic tanning in short wave diathermy. Any short wave therapy unit would given out the desired energy to the patient only as long as the unit is correctly tanned to the electrical values of the object. Therefore tanning must be beginning of the treatment . The RF current in the patients circuit changes a capacitor to a vtg. Whose polarity and magnitude is measure of defunning of the patient circuit . This vtg accordingly moves a sensor motor , adjusting a tanning capacitor so the resistance is registered.

Procedure:

i)Switch on the power supply.
ii)Make all the necessary connections.
ii) Place both the palms on the electric pads.
iv)A sensation of heat is experienced in the tissue due to RF wave generated.

Conclusion:

Hence short wave diathermy is studied . The RF wave generated penetrates the skin and heats up the tissues without burning the skin.

Experiment No.10
To Study The Ultrasonic Nebulizer

Aim: - To study the Ultrasonic nebulizer

Requirements: - Ultrasonic nebulizer instrument.

Theory;-

In order to prevent damage to patients lung air or O2 applied during reparatory therapy must be humidified when therapy requires that water or some type of medicine be suspended in inspired air as an aerosol device called as nebulizer is used in water or medication is picked up by high velocity i.e of O2 & thrown against surface to breach substance in to controlled size droplets which are then applied to patient via respiratory.

Ultrasonic nebulizer produces high intensity sound energy well above audible range when applied to medication. Ultrasonic energy vibrates the substance with such intensity that high volume of minute particles is produced. It consists of generator that produces radio frequency current to derive ultrasonic transducer & nebulizer itself in which transducer generates ultrasound energy and applies to medication or water.

Procedure:-

34. Switch on power supply & fill it with aerosol.
35. Observed vaporization of medicine which can be used on patient.
36. Select appropriate flow rate.

Conclusion:-

Thus Ultrasonic Nebulizer has been studied.