



Winter- 15 EXAMINATION

Subject Code: 17671

Model Answer

Page No: \_1\_/ 19

**Important Instructions to examiners:**

- 1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
- 2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
- 3) The language errors such as grammatical, spelling errors should not be given more importance (Not applicable for subject English and Communication Skills).
- 4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
- 5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
- 6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
- 7) For programming language papers, credit may be given to any other program based on equivalent concept.

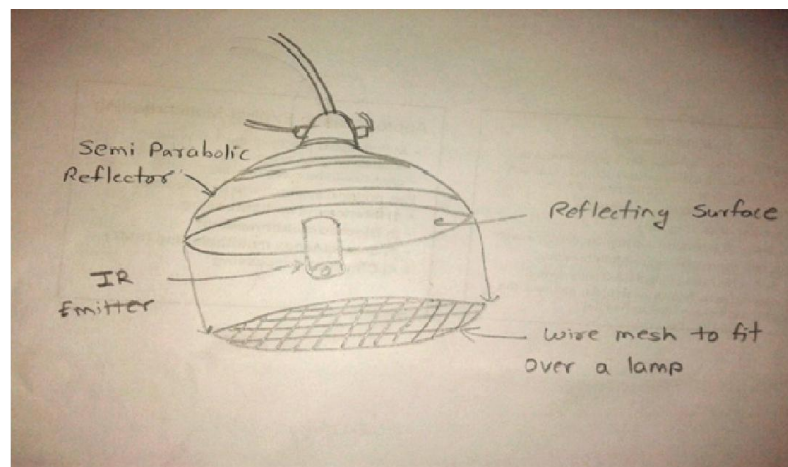
**Qu. 1 (a) Attempt any Three**

**Marks 12**

- i. **Draw constructional sketch of Non Luminous generators of IR and explain its working.**

**Non Luminous generator Construction & working**

(2 marks for any equivalent diagram)



**(2 marks explanation)**

- It consists of a coil of wire wound on the cylinder of some insulating material such as fire clay or porcelain. An electric current is passed through the wire and produces heat.
- IR rays are emitted from the hot wire and from the fire clay former which is heated by conduction. It provides IR rays only.
- The elements are placed at the focal point of a parabolic or gently curved spherical reflector.
- The reflector is mounted on a stand and its position can be adjusted as required.



- All non luminous elements require some time to heat up before the emission of rays reaches to maximum intensity.
- Hence lamp must be switched at proper time before they are required.
- Non luminous elements produce IR rays with wave length from 750 nm – 15000 nm.

ii. Draw a labelled diagram of Traction Unit

Block Diagram of traction unit

( Block dia. 4 Marks)

Block Diagram of lumbar & Cervical traction

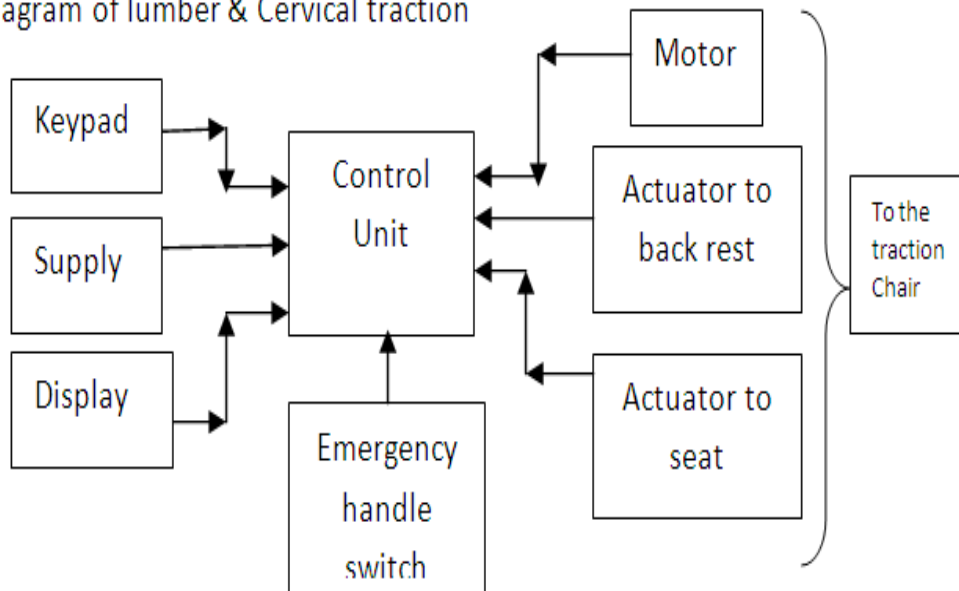


Fig 1 Block diagram traction unit

iii. State the precautionary steps for ultrasound therapy unit for following conditions- 4

1. **During therapy reflection of ultrasound occurs-** Remove the metal surfaces and other reflecting material from the treatment area
2. During therapy original intensity of ultrasound doesn't get transmitted to the patient-
3. During therapy if transient cavitation occurs-
4. **If burn occurs; due to therapy-** Stop the therapy immediately and let the burns recover. Reduce the intensity and duration of treatment so as to suitable for patient.

iv With the help of graph explain 'Lewis's' hunting reaction.4

**Circulatory response**

The initial response of the skin to cooling is an attempt to preserve heat, and this is accomplished by an initial local vasoconstriction. This

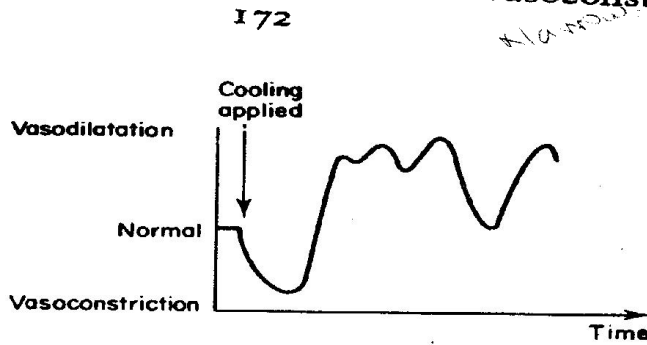


Fig. 6.1 'Lewis's hunting reaction': the effect on circulation of applying ice to the skin. (After Keatinge 1961.)

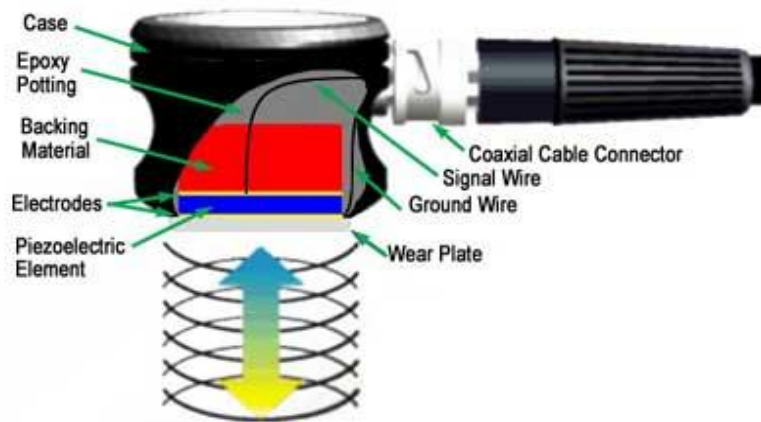
homeostatic response has the effect of allowing the part to become very cold. After a short period (the duration depending on the area involved) there follows a vasodilatation and then alternate periods of constriction and dilatation (Fig. 6.1). This apparent 'hunting' for a mean point of circulation is called *Lewis's hunting reaction*. Some authorities suggest that during the periods of vasodilatation the arteriovenous anastomosis is closed, thus causing an increased blood flow through the capillaries. This is beneficial in the treatment of swelling and tissue damage.

Qu. 1 (b) Attempt any One

Marks 06

a. With the help of neat diagram explain the production procedure for ultrasound waves and also list out applications of ultrasound therapy (any four)

Constructional diagram of ultrasound therapy transducer (2 Marks for any equivalent diagram showing all parts)



Constructional diagram of ultrasound therapy transducer



Procedure for Production of ultrasound-

(2marks)

- It consists of piezoelectric crystal like Lead Zirconate Titanate (PZT).
- A high frequency (0.75 to 3MHz) AC current is applied to crystal whose acoustic vibrations causes the mechanical vibrations of transducer head, which is directly located in front of the crystal.
- To get as much energy out of transducers as possible an impedance matching is to be made which is done by keeping proper matching layer in between the front plate and the electrodes. The matching layer must be half the thickness of the pzt crystal.
- For the contact type transducer matching layer is made up of such a material that it should protect the active element from scratching.
- In order to direct the energy out from the crystal the backing material is applied to the surface of the crystal opposite to the head of the transducer.
- Due to this the waves travels out only from one surface of the transducer. The backing material supporting the crystal with impedance similar to the active element will produce the most effective damping.

Applications of ultrasound

(2marks)

Ultrasound transducer is widely used in medical field to:

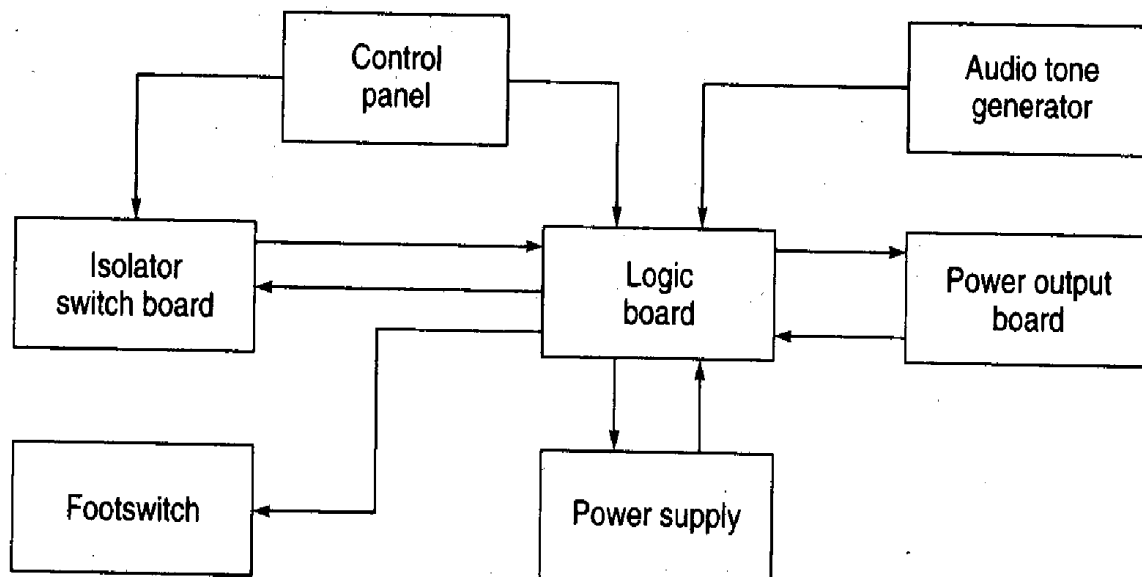
- Take pictures of developing fetus
- Break up kidney stones
- To look at internal organs
- To check blood flow.

The result of absorption of ultrasound in the tissue is due to the oscillation of particles about their mean position. This oscillations or sonic energy is converted into heat energy which is proportional to the intensity of ultrasound. This heat energy can be used for treatment in the following ways:

- Healing or thermal effect
- Micro-massage or mechanical effect
- Chemical and biological effect (wound healing )

ii. Draw a neat labelled block diagram of solid state electro-surgical unit and give function of each-block.

(Block diagram 2 Marks)





It consists of a high frequency power oscillators . The frequency of operation is 250 KHz To 1MHz The heart of the system is logic & control unit which produces the basic signals and various timing signals for cutting & coagulation modes of operation. An astable multivibrator generates 500KHz square pulses. The output from this mv is divided into no of frequencies by binary counters. These are the frequencies which are used as system timing signals. 250KHz signal provides a split phase signal to drive output stages on the power o/p ckt. A 15 KHz signal produces the representation rate for the cycles of 250 KHz signals which make the coagulation output. The pulse width of the o/p is set at about 12μsec.

The 250 KHz signal used for cutting is given to power o/p stage. Where it controls the push pull parallel power transistor o/p stage. The o/p of this amplifier is applied to a transformer which provides voltage step up & isolation for the o/p stage of the machine.

In order to facilitate the identification of each mode of operation the machine incorporate an audio tone generator. The isolator switch is provided control between the active hand switch & the rest of the unit. There is a provision to interrupt the power o/p if it is desired.

Beside this basic functional ckts logic ckt are used to receive external control signals & to operate isolating relays. A thermostat is mounted on power amplifier heat sink. Solid state m/cs mostly incorporate an independent bipolar RF generator for microsurgery offering a fine output power control.

4

## Qu. 2 Attempt any FOUR

Marks 16

### a. Need of traction unit

(1mark for each point)

In orthopedic medicine traction refers to the set of mechanism for straightening broken bones or relieving pressure on the spine & skeletal system. The purpose and need of traction is to –

1. Regain normal length and alignment of involved bone.
2. To rescue an immobilized and fractured bone.
3. To lessen or eliminate muscle spasm.
4. To prevent or reduce skeletal deformities or muscle contraction.

### b. Give the significance of constant current impulses in electrotherapy.

(4 marks)

**Electrotherapy** is the use of electrical energy as a medical treatment. In medicine, the term *electrotherapy* can apply to a variety of treatments, including the use of electrical devices such as deep brain stimulators for neurological disease. The term has also been applied specifically to the use of electric current to speed wound healing. Additionally, the term "electrotherapy" means employing low voltage low frequency currents. Electrotherapy is an accepted practice in physiotherapy dept. The biological reactions produced by the management of many diseases affecting muscles & nerves.

A current which varies sufficiently in magnitude can be stimulate a motor nerve & so produce contraction of the muscles to which it is supplied. In absence of motor nerve muscles fibers can be stimulated directly by suitable current.

This technique is used for the treatment of paralysis with totally or partially denervated muscles for treatment of pain, muscular spasm etc.

This can be applied by following application techniques

- Monopolar technique (Labile technique)
- Bipolar technique (Stabile technique)
- Active pad electrode covering group of muscles



- c. List different application techniques of ice therapy and explain any one application for the same procedure for immersion technique.

The application techniques of ice therapy are -

(2 marks for any four)

The way in which ice is applied will vary according to the effect required. It may be applied in the following ways:

1. Ice towels
2. Ice packs
3. Immersion
4. Ice cube massage
5. Excitatory cold (quick ice)

(2 marks for explanation)

### **Immersion**

**Immersion is a technique in which the part to be treated is immersed in an ice solution. Unfortunately it is only practical to immerse certain areas such as hands, feet and elbows.**

#### ***Preparation***

**The solution is made up of 50% ice and 50% water placed in a suitable container.**

#### ***Application***

**The patient immerses the part in the solution and keeps it in either for a single ten-minute session or for a series of shorter immersions until a cumulative total of ten minutes has been reached. Often the patient experiences intense pain in the immersed area, sometimes severe enough to cause him to faint. He should therefore be suitably supported, and watched throughout the treatment.**

- d. For following effect of electric current state the range of currents-

(1mark each for correct range, it may slightly different in different reference books)

- i. Let-go current – 1mA to 10mA
- ii. Physical injury and Pain – 10mA to 20mA
- iii. Ventricular fibrillation – 50mA to 200mA
- iv. Heart- stops beating – 200mA to 500mA

- e. State the maintenance steps carried out for electrosurgical unit

(4 marks for any 4 points)

1. Check mains power is present at socket using equipment.
2. Check ESU & make sure that both power indicators are off when switch is off
3. Put the plug of unit in socket & grounded AC current.
4. Check power switch is ON. Replace fuse with voltage & current rating if blown.
5. Check controls for correct positioning & operation.
6. Check all bulbs, heaters & connectors for function, repair or replace if necessary.
7. Check for leakage current, check grounding connection.
5. Put plug of hand piece in black socket labeled hand piece on the panel.
6. Put plug of Patient plate in socket labeled plate.
7. Choose correct electrode tip for desired procedure



8. Open the machine and test the continuity of circuit at different test points.
9. Repeat the above procedure and test the performance of the machine for different level controls.
10. Make sure insertion is complete & metal part is not exposed & closed tip of hand piece by turning clockwise. Start machine.

**f. Explain the contraindications of cold therapy**

(4 marks 1m for each)

Contraindications of cold therapy:

1. It should not be used to particularly the elder patients as it may create discomfort to them.
2. To be avoided in cardiac conditions: The initial shock of the ice application may cause a marked drop in blood pressure thus causing an increase in heart rate. It can cause problem to heart patient.
3. To be avoided in peripheral nerve injuries: These types of injuries lose their normal response to cooling. If such an area were cooled with ice it may become very cold and take many hours to regain normal temp.
4. Peripheral vascular disease: As cold application may reduce an already inadequate blood supply , ice is avoided.

While cold therapy is a good treatment option for many musculo-skeletal conditions, cold therapy should be

--	--	--

avoided in people with

- Impaired circulation or blood flow
- Open or infected wound
- Hypersensitivity to cold
- Poor or absence of sensation
- Reynaud's disease
- Acute dermatitis or eczema

Cold application should also not be used on people who are unable to communicate.

**Qu. 3 Attempt any FOUR**

**Marks 16**

- a. Differentiate between UV and IR lamp on the basis of following points

(4 marks for correct points)



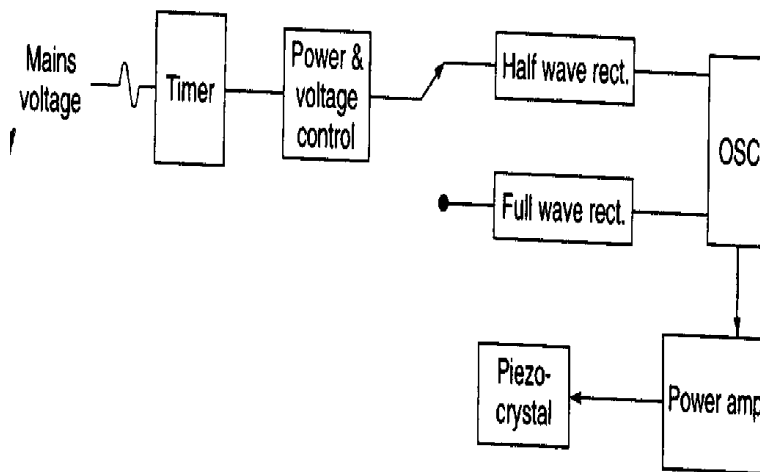
**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**  
(Autonomous)  
(ISO/IEC - 27001 - 2005 Certified)

Wave length	<b>IR Lamp</b> 1 It emits the IR radiations in the range of 750nm-1500nm IR lamps emit IR radiations	<b>UV lamp</b> 1. It emits the UV radiation in the range of 280-400nm UV lamps emits UV radiations
Constructional Difference	2 It consist of a coil wound on a cylinder which is made up of a insulating material Then electric current is passed through the wire and IR rays are emitted.	2. It consists of U shaped quartz tube or burner which acts as a point source.
Application area	3 Muscles, infected wounds, body parts having odema	3. Skin
Advantages & Disadvantages	4 Pain relief, Reduction in muscle spasm Sweating, Burns	4 To have sterilization effect on skin, Production of vitamin D Peeling, Ageing

b. **Draw a labelled diagram of ultrasound therapy machine and state technical specification for the same.**

Block diagram of ultrasound therapy machine

(2 Marks for Block diagram)



**Technical specifications of ultrasound therapy machine**

(any 4 correct specification ½ mark each)

1. Input supply voltage: 230V AC, 50Hz.
2. Output power: 21 watt for pulse mode, 15 watt for continuous mode.
3. Frequency of operation: 0.75-3MHz
4. Maximum setting time: 15min.
5. Treatment head radiating area: 5 to 6 cm<sup>2</sup>

c. **Enlist the technical specification for Solid state cautery machine.**

Technical specifications of Solid state cautery machine-  
specification)

(1 Mark for each

- i. Input power- 230 V, 50 Hz





- ii. Frequency of operation – 250KHz – 1MHz
- iii. Power delivering output – 400w for cutting and 150w for coagulation
- iv. Coagulation duration – 10-15 sec

**d. Prepare the installation procedure for nerve muscle stimulator.**

**Steps to be carried out for installation of nerve muscle stimulator-** (4 marks for any 8 correct points)

1. Open all the boxes of machine.
2. Check the accessories such as power cord, pads and electrodes.
3. Check all parts for any damage and/or short shipment.
4. Connect all the parts of machine.
5. Check all the knobs and buttons for any damage, check working of the same.
6. Connect the supply cord to 230V, 50 Hz AC mains.
7. Connect the electrodes
8. Switch 'ON' the machine.
9. Select the mode for operation as stabile or labile.
10. Press the switch according to the mode selected

**e. State the principle of working of cold therapy**

Principle of working of cold therapy- (4 marks)

Application of cold to the tissues after injury is an old practice. When ice is applied to the skin heat is conducted from the skin to the ice in order to melt it. Consequently it is used to reduce pain, reduce spasticity, reduce muscle spasm and swelling, to promote repair. The initial response of the skin to cooling is an attempt to preserve heat.

**Qu. 4 (a) Attempt any THREE**

**Marks 12**

**i. Differentiate between shortwave and microwave diathermy**

Differentiation between shortwave and microwave diathermy (2marks 1 mark for each pt.)

Sr. No.	Parameter	Shortwave Diathermy	Microwave Diathermy
1	Wavelength	3meters to 30 meters For therapeutic purpose 11mts	1 cm to 100 cm For therapeutic purpose 12.25cm, 69 cm
2	Application	It is used for the treatment of inflammation, bacterial infection pain relief and reducing healing time.	It is suitable for lesions in superficial tissues and with high fluid content, hence used for rheumatic conditions for small joints.



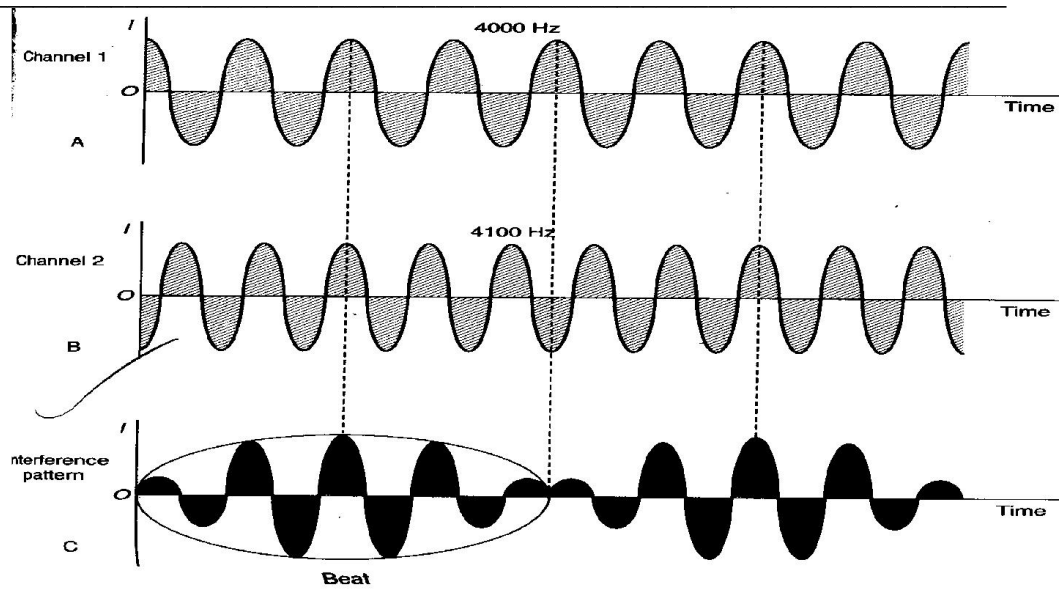


Fig. 10 Waveforms for Interferential current therapy

Qu. 4 (b) Attempt any One

Marks 06

- i. 1) List and explain electro-surgery technique (1 mark each to state and explain any 3 technique)

#### Different methods of cutting and coagulation

- Cutting or electrotonomy:** when electrode touches the tissue sufficiently high power density is applied to the cells. So there is boiling effect of the cell fluid it vaporizes and tissues get torn apart. Needle type electrode is used for this purpose.
- Coagulation:** Coagulation of tissues is caused by high frequency current flowing through the tissue and heating it locally so that it coagulates from inside. Ball type electrode is used for this purpose.
- Fulguration:** It is superficial tissue destruction without affecting deep seated tissues. Electrode in the form of needle or a ball electrode held near the tissue without touching it. An arc is formed whose heat dries out the tissues.
- Desiccation:** In this a needle point electrode is stuck into the tissues & then kept steady. This treatment may be used for treating the nodules under the skin where minimum damage to the skin surface is desired.

- 2) Draw cutting electrodes used in diathermy machine and label it. (1 mark each to draw any 3 electrodes)

(a) Needle electrode



(b) Angulated lancet electrode



(c) Wire loop electrode



(d) Angulated band loop electrode



(e) Straight lancet electrode





### Cutting electrodes used in diathermy machine

ii. **With a neat labelled diagram explain inductive field and capacitive field application techniques of short-wave diathermy machine**

Application techniques of Short Wave Diathermy

(3M for each techniques )

Pattern of tissue heating is greatly affected by the method of SWD delivery

b) In SWD the transfer of electrical energy to the patient occur via an electrostatic or an electromagnetic field .therefore there are 2 methods of application

1. capacitive or condenser field or plate method
2. inductive or cable or inductotherapy method

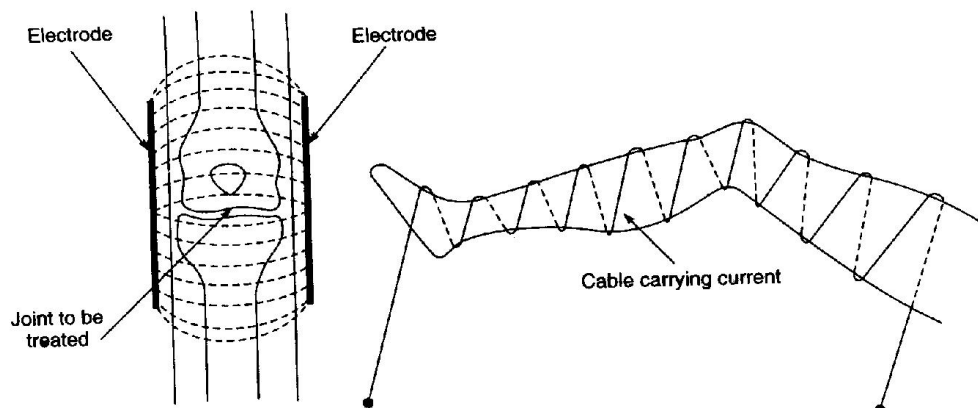
#### capacitive method

In capacitor field method the output of SWD machine is connected to the metal electrodes which are positioned on the body over the region to be treated

Electrodes are placed on each side of the body part to be treated In the terminology of the diathermy these electrodes are called as PADS. Electrodes don't directly come in contact with the skin usually layers of towels are interposed between the metal plate and the surface of the body. The pads are placed so that the portion of the body to be treated is sandwiched between them. This arrangement is called condenser method.. The metal electrodes act as two plates of the capacitor while the body tissue along with insulating material forms the dielectric of the capacitor. When RF output is applied to the electrodes rapidly alternating charges are set up on the electrodes and gives rise to an alternating electric field between them. Due to the dielectric losses of the capacitor heat is generated in the tissues. Dielectric losses takes place due to the rotation of dipoles and the vibrations of the ions in the tissue fluids and molecular distortion in the tissues

#### Inductive Method

In this the output of SWD machine is connected to a flexible cable. When SWD is applied by the use of cable the effect of electric field or magnetic field may be used. The electrode consists of a thick insulated cable which completes the patient circuit of the machine A cable is arranged in contact with the patient so as to cover the treatment area but separated from the patient's body by a layer of an insulating material as shown in fig. This cable is coiled around the arm or knee or any other portion of the patients body where plate electrodes are inconvenient to use. When RF current is passed through this cable the heating is produced inside the body



Capacitive Method

Inductive Method



Qu. 5 Attempt any FOUR

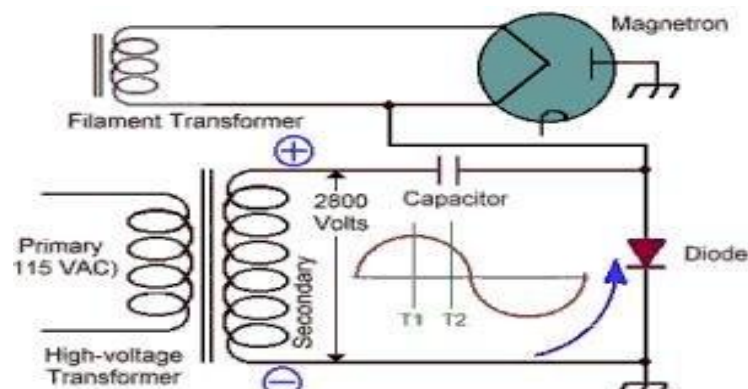
Marks 16

a. Enlist precautions to minimize electric shock hazards. 4

Any 4 for 4 marks

1. Ensure that your electrical installation fulfills all the safety regulations.
2. Make sure that all parts of the circuit is well mounted and nothing can be moved accidentally
3. Make sure, all conductive and non-conductive objects are away from your circuit
4. Keep electrical equipment away from water or any other liquid, conductive or not
5. Always check electrical cords and connectors for fraying and signs of wear and defects, as well as any electrical equipment you are about to use
6. Use the special safety rubber gloves and rubber shoes
7. The floor you are standing on must be properly insulated from ground
8. Use only the correct cable sizes
9. Have extra emergency shut-off switches with big push-and-lock buttons within your approach
10. Have extra circuit protection devices, such as fuses, circuit breakers, and ground-fault circuit interrupters just for your lab
11. Recheck all the wires and connectors for bad connections and signs of wear and defects.
12. All electrical equipment must be well-grounded
13. Minimize the use of electrical equipment in cold rooms or other areas where condensation is likely. If equipment must be used in such areas, mount the equipment on a wall or vertical panel.

b. Draw and explain circuit diagram of microwave diathermy equipment. 4



2mks

Circuit for Microwave generation

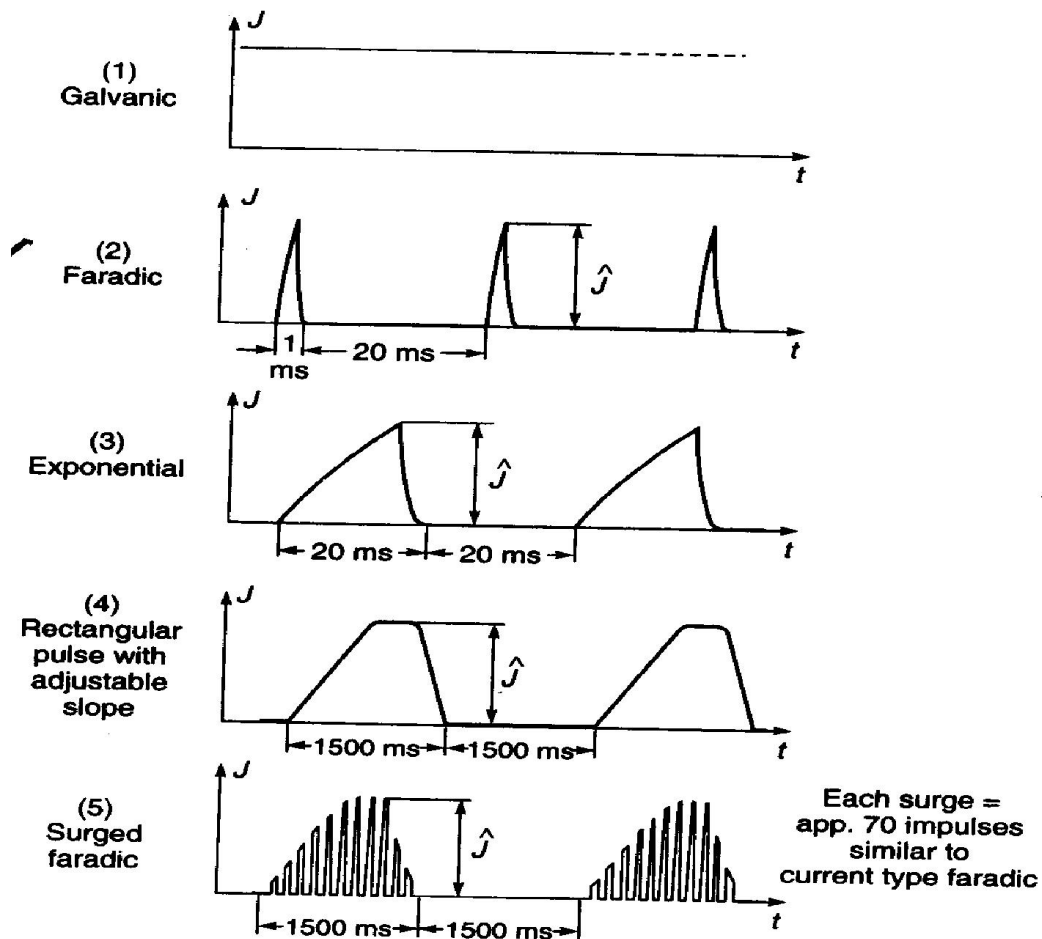
When the electromagnetic energy of the microwave radiation is absorbed in the tissue, it provokes ionic movements, rotation of the dipoles and causes distortion of the molecules of the insulators. The amount of heat produce inside the tissue depends upon the fluid contents. The microwave penetrates deeper than infrared rays. The affective depth of penetration of MWD is 4.3 cm. The half value depth of MWD is 3cm. As Microwaves are more absorbed by the water so those tissues which have good blood supply like muscle are heated mostly while those tissues which have low fluid contents like fat produces less heat. The depth of penetration of MWD is frequency dependent. As the frequency decreases the depth of penetration increase



i.e. MWD has two therapeutic frequencies 915 MHz and 2,450 MHz, The depth of penetration of 915 MHz is greater than 2,450 MHz. 2mks

c. Draw different current waveforms normally employed in electrotherapy and list their specific applications.

( 4marks - any four 1/2 m diagram 1/2m application each)





### 1. Galvanic current

It may be used for the preliminary treatment of autonic paralysis (muscles are completely deactivated or weak) deactivated and for the treatment of disturbance in blood flow for the treatment of disturbance in blood flow. It is also used for intophoresis (introduction of drugs into the body through the skin by electrolytic means) in general the intensity of the current passing through any part of the body does not exceed  $0.3-0.5\text{mA/cm}^2$  of electrode surges.

### 2. Faradic Current

This is used for the treatment of muscular weakness after lengthy immobilization when a patient is enable to produce muscle contraction or finds difficulty in doing so. This electrical stimulation may be used in accessing voluntary contraction.

### 3. Exponentially progressive current

It does not stimulate the surrounding healthy tissue. This current is useful for the treatment of functional paralysis.

### 4. Interrupted DC or rectangular pulses with adjustable slope.

It is used for the treatment of denervated muscle and to improve the condition of muscle having severe paralysis

### 5. Surged Faradic

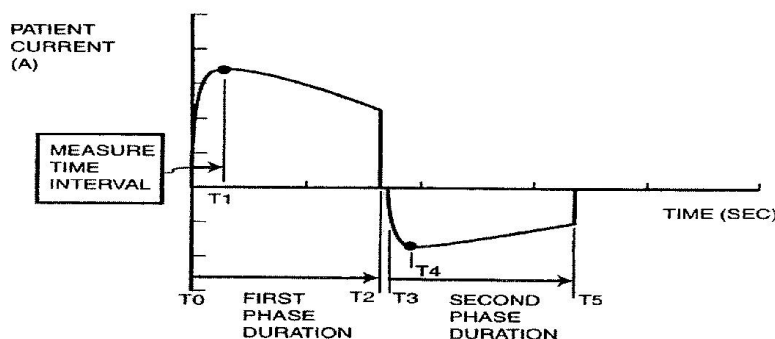
It is used for the treatment of functional paralysis. It is used also for the treatment of spasm, pain and for the odema and inflammation.

### 6. surge faradic current:

, It is used to provide relaxation and contraction of muscles. The ratio of ON time and OFF time of surging is also adjustable so that graded exercise may be given.

### 7 Biphasic Current

The cell recovery from the effect of stimulus current can be achieved by the passage of lower intensity current of opposite polarity over a longer period. Such type of combination of positive and negative pulse is called as biphasic stimulation. In this the stimulating pulse are followed by a pulse of opposite polarity of  $1/10^{\text{th}}$  of the amplitude and 10 times the width.



Biphasic current



d. List Applications of cold therapy (any four)

Applications of cold therapy are

(4 Marks 1 m each any four)

**The application of cold to the tissues after injury is a practice as old as medicine itself. Nowadays the local temperature of the tissues may be reduced by the application of various forms of ice or frozen gel packs, or by the evaporation of volatile fluids from the skin. Often the skin temperature is reduced to  $10^{\circ}\text{C}$ .**

Ice therapy may be used to:

1. Reduce pain.
2. Reduce spasticity.
3. Reduce muscle spasm.
4. Reduce swelling.
5. Promote repair.
6. Provide excitatory stimulus when muscles are inhibited.

By far the most common method by which cold is applied to the body is using ice therapy and this will therefore be described in greater detail than the other methods.

e. Classify the electric shock and state its significance of each type. (2marks classify 2M significance)

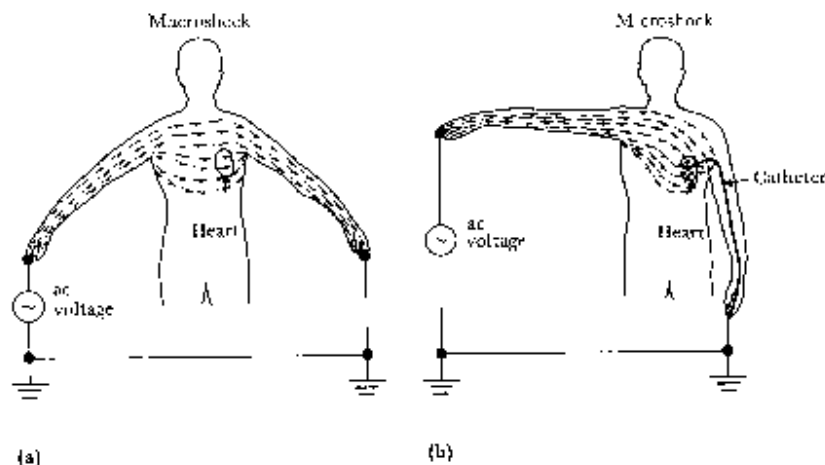
An electric current could flow through the body unintentionally in one of the two situations explained below.

**Macroshock Hazard**

If an undesirable electric current enters and leaves the body through contacts on a limb such as the hand, arm, or foot, this is called a macro shock hazard, as shown in Figure 6. In this case the path of the current is quite wide as it passes through the chest where the heart is located. Only a small part of the total current affects the heart. Therefore the hazard is less. The dangerous current level of 10 milliamperes stated above is for a macro shock hazard.

**Microshock (Cardiac Shock) Hazard**

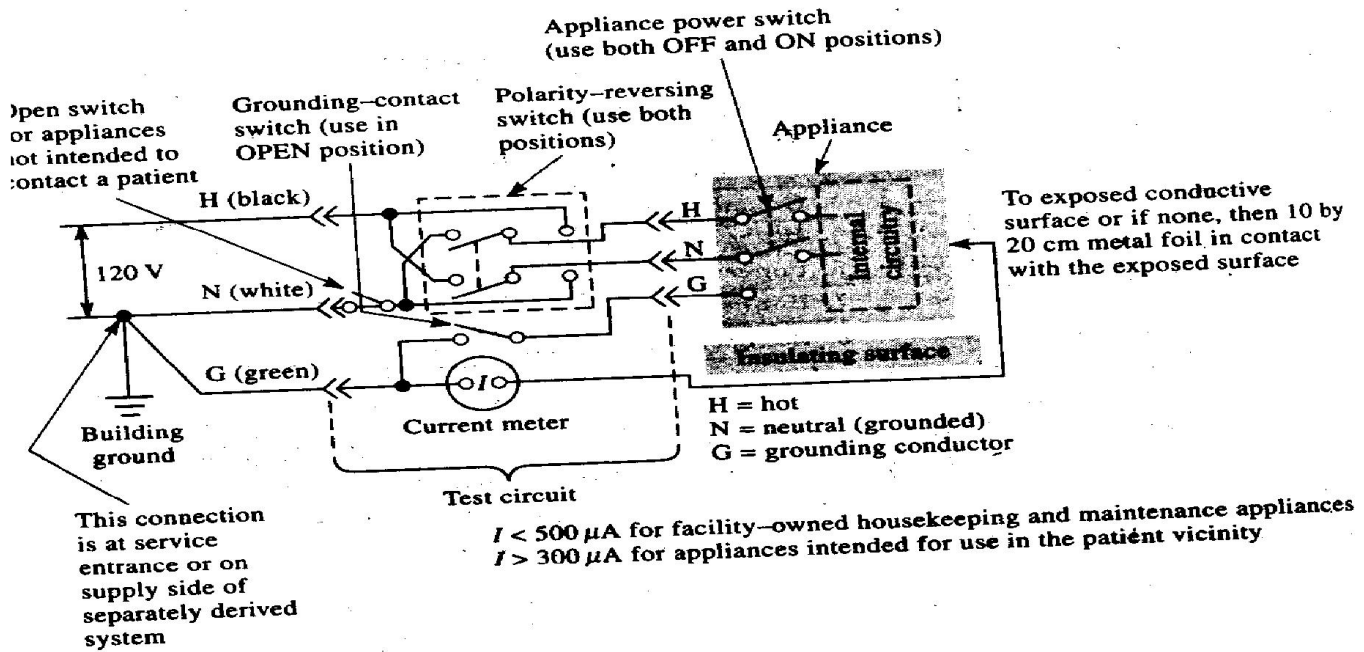
If in any way an electric current passes through the body with a direct electrical contact on the heart, this is called a micro-shock or cardiac shock hazard. Since all of the current would pass through the heart, the hazard is much more in even very small currents could damage the heart. The dangerous level of current directly applied to the heart could be as low as 10 microamperes. The micro shock hazard is normally limited to medical administration of electrically operated equipment on patients. The prevention of the above-mentioned electric shock hazards share many common and some specific techniques, as summarized below. the sense that







f. Draw and explain the block diagram of leakage current meter. 4



Qu 6 Attempt any FOUR

16 Marks

a. List down the steps carried out for installation of short wave diathermy.

(4 Marks)

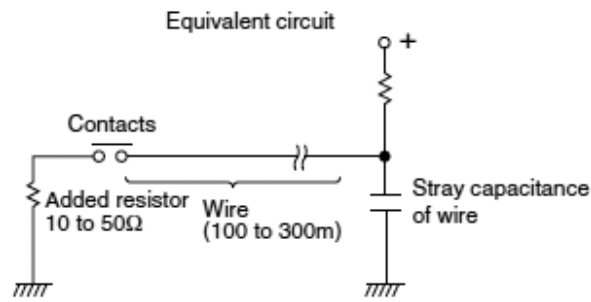
Any 4 steps for 4 marks

1. Open the box of machine.
2. Check all the accessories like power cord, pads, electrodes as per list.
3. Check all parts for any damage and/or short shipment.
4. Connect all the parts into the proper place on SWD machine.
5. Check all the knobs and buttons for any damage, check working of the same.
6. Connect the machine to 230 V 50 Hz proper supply.
7. Check the performance of the machine with different control levels.
8. Repeat the above procedure and test the performance of the machine for different level controls.
9. If the output of the test as per standard, make the documents regarding installation completion.

b. Explain how stray capacitance generates the leakage current

(4 marks)

In electrical/ electronic circuits, **parasitic capacitance**, or **stray capacitance** is an unavoidable and usually unwanted capacitance that exists between the parts of an electronic component or circuit simply because of their proximity to each other. All actual circuit elements such as inductors, diodes, and transistors have internal capacitance, which can cause their behavior to depart from that of 'ideal' circuit elements. Additionally, there is always non-zero capacitance between any two conductors; this can be significant at higher frequencies with closely spaced conductors, such as wires or printed circuit board traces.



Stray capacitance causing leakage current

c. **List Medical applications of LASER and explain any one in detail.**

(Any 4 appli. 2 marks, 2 mark for explanation of any one)

1. Lasers are presently used for variety of applications in medical field. The medical use of laser is suitable where there is a favorable interaction between laser radiation and human tissues. The success of laser therapy depends upon :-

- Radiation wavelength.
- Ability of tissues to absorb this wavelength.
- Power delivered on laser on treatment area.
- Total energy incident on tissues & area treated.

Different medical applications are-

- Tissues Healing - Laser radiations are used to accelerate wound healing for this purpose red part of visible spectrum have been particularly employed and found to be effective .
- Pain control- Laser therapy is used for relief of acute and long term pain ,it can be used for treating of rheumatoid arthritis
- Osteoarthritis- Various back pains, nerve inflammation , muscular sprain etc lasers help in pain relieving effect and reduction of joint swelling pain is also treated by application of laser source to trigger acupuncture points neurogenic pain can be relieved in some patient by laser application.
- Ratinal Coagulation- The heat generated by laser results in retina being attached with the choroid.
- Measurement of eye activity

d. **Explain the effects of electric current on human tissue.**

(4 marks )

**Effect of Electric current on Human Tissues: any 4 points for 4 mks**

- It is an application of high frequency electric current through the biological tissue. It can be used to cut coagulate desiccated or fulgurate the tissue.
- The tissues are heated to such an extent the cells which are immediately under the electrode are torn apart by the boiling of the cell fluid. Its benefit includes ability to make precise cut with limited blood loss. The frequency of current used in surgical diathermy machine is in the range of 1-3MHz. Surgical diathermy depends on the heating effect of electric current.
- When high frequency current flows through the sharp edge of the wire loop or a point of a needle to the tissue, there is high concentration of current occur at that point.
- The current flowing through the active electrode and passive is the same. But as the active electrode has very small cross sectional area the current density of an active electrode is much larger than the current intensity of the passive electrode.



**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**  
(Autonomous)  
(ISO/IEC - 27001 - 2005 Certified)

---

- As there is difference between current density of two electrodes the tissues under passive electrode are heated slightly while the tissues under active electrode, are heated to cause cutting.

**e. Discuss the precautions to avoid shock hazards in electro surgery machine. ( 4 marks )**

**Safety Precautions: any 4 points for 4mks**

1. Inspect machine for worn or broken wires before use.
2. Keep ESU electrode in non-conductive holder when not in use- this prevents accidental activation.
3. Liquids or solutions should not keep near the patient plate.
4. Don't keep ESU foot switch in pool of liquid.
5. Do not turn ESU activation sound completely off—sound also alerts surgical team to accidental activation of ESU.