



**SUMMER– 2017 EXAMINATION**

**Model Answer**

**Subject Code:**

**17671**

**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 error 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.

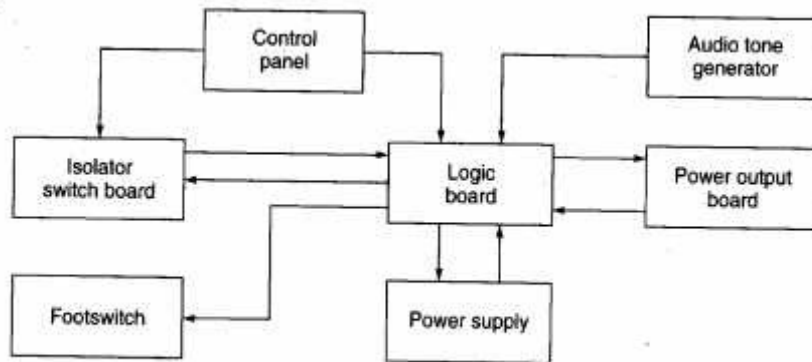
Q. No.	Sub Q. N.	Answer	Marking Scheme
1.	(A)	<b>Attempt any THREE.</b>	<b>12</b>
	a)	<p><b>State any four therapeutic uses of IR.</b></p> <p><b>Ans:</b></p> <ol style="list-style-type: none"> <li>1. Pain relief- heating irritates the sensory nerves ending &amp; relieves pain by counter irritation.</li> <li>2. Reduction in muscle spasm.</li> <li>3. Acceleration of healing or repair</li> <li>4. Reduction of fungal infections – by regular IR therapy the through drive of skin surface is effective in reducing fungal infection.</li> <li>5. Treatment for paralysis.</li> <li>6. Reduction in odema.</li> </ol>	<b>04</b>
	b)	<p><b>Draw the block diagram of CPM machine. State the function of each block.</b></p> <p><b>Ans:</b></p> <p style="text-align: center;"><b>Fig: Block diagram of CPM machine</b></p> <p><b>Function :</b></p> <p>The CPM contains timer circuit which is used to set treatment time. Before starting the machine to set flexion, extension, speed and pause duration using limit set circuit. Motor &amp; relay driver circuits are used for movement of the CPM machine. If patient have discomfort then patient switch is used for ON and OFF machine. CPM means continuous passive motion. In this therapy there is no involvement patient's muscle. Force is not applied. It is specially used as post-operative therapy. When patient is unable or find difficult to move any body part especially joints such as Knee joint, Shoulder joint etc. after surgery or lengthy immobilization then CPM machine is used to give passive movement to that body part so that patient will be able to move it freely. It is complete passive movement; there is no involvement of any muscles of patient. Types are Knee joint, Shoulder joint, wrist joint etc.</p>	<b>02</b>  <b>02</b>
	c)	<p><b>Suggest application technique of ultrasound therapy for:</b></p> <ol style="list-style-type: none"> <li>i) Injured body part.</li> <li>ii) For irregular surface.</li> </ol> <p><b>Ans:</b></p> <p><b>i) Injured body part: Water bath</b></p> <p>If there is a wound or injury the treatment may be carried out in water bath this is to avoid mechanical contact with the tissues which may be damaged. In this method it should be ensured that air bubbles are not present either on the probe or onto the skin. For this degassed water must be used. While giving treatment the body part must be rubbed with alcohol and kept in a water bath. The probe is moved over the area to be treated but held at a distance of about 1 -2 cm from patients body.</p>	<b>02</b>



	<p><b>ii) For irregular surface: Water Bag</b> On irregular body surface (joints) a rubber bag filled with degassed water can be used. A coupling medium has to be placed both between the rubber bag and the skin and between the rubber bag and treatment head to avoid any presence of air. The treatment head is moved over the water bag in the same way as if on a patient's skin.</p>	<b>02</b>
d)	<p><b>State and explain the principle of cold therapy.</b> <b>Ans:</b> 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.</p>	<b>04</b>
(B)	<p><b>Attempt any ONE</b></p>	<b>06</b>
a)	<p><b>Draw the block diagram of ultrasound therapy machine. State function of each block. List any four technical specifications of ultrasound therapy machine.</b> <b>Ans:</b></p> <p><b>Fig: Block diagram of ultrasound therapy machine</b></p> <p><b>Function :</b> The ultrasonic generator or ultrasound therapy machine is constructed on the basis of Piezoelectric effect. A high frequency oscillator of current of 0.75-3MHz is applied to a crystal whose acoustic vibrations cause the mechanical vibrations of the transducer head. The block diagram shows typical ultrasound therapy unit. The heart of the system is an oscillator which produces the oscillations of required frequency. 230AC, 50Hz is applied to a timer circuit through a fuse of 1A rating. The timer is set for the duration of ultrasonic therapy treatment which can be varied from 0 to 30 minutes. Unless the timer is switched ON, the input supply is not passed to the power control system. A neon lamp is used as the mains indicator. It is an AC power control circuit using DIAC and TRIAC. The output of oscillator can be controlled by controlling the output power of the circuit and it can be done directly by using a variable transformer or by controlling the firing angle of TRIAC. The machine can be operated in either continuous or pulsed mode by switching the output of power and voltage control circuit to half wave rectifier or full wave rectifier. The rectifier output is given to the oscillator which generates the output of 1MHz frequency. The power amplification is done with the power amplifier and finally it is given to the piezoelectric crystal.</p> <p><b>Technical specifications of ultrasound therapy machine :</b></p> <ol style="list-style-type: none"><li>1. Input supply voltage: 230V AC, 50Hz.</li><li>2. Output power: 21 watt for pulse mode, 15 watt for continuous mode.</li><li>3. Frequency of operation: 0.75-3MHz</li><li>4. Maximum setting time: 15min.</li><li>5. Treatment head radiating area: 5 to 6 cm<sup>2</sup></li></ol>	<b>02</b>               <b>02</b>

b) Draw the block diagram of solid state cautery machine. State the function of each block. List any four technical specification of solid state cautery machine.

Ans:



> Fig. 27.4 Block diagram of solid state electro-surgical unit

**Function :**

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.

**Technical specifications of Solid state cautery machine :**

1. Input power- 230 V, 50 Hz
2. Frequency of operation – 250KHz – 1MHz
3. Power delivering output – 400w for cutting and 150w for coagulation
4. Coagulation duration – 10-15 sec.

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2.		<b>Attempt any <u>FOUR</u></b>	<b>16</b>										
	a)	<p><b>Compare CPM and traction on the basis of any four points.</b> <b>Ans:</b></p> <table border="1"><thead><tr><th>CPM</th><th>Traction</th></tr></thead><tbody><tr><td>1. In this therapy there is no Involvement of patient's muscle.</td><td>1. In this therapy there is Involvement of patient's muscle.</td></tr><tr><td>2. Force is not applied</td><td>2. Force is applied</td></tr><tr><td>3. It is specially used as post operative therapy</td><td>3. It is used as routine therapy</td></tr><tr><td>4. Types are Knee joint Shoulder joint</td><td>4. Types are Cervical traction Lumber Traction</td></tr></tbody></table>	CPM	Traction	1. In this therapy there is no Involvement of patient's muscle.	1. In this therapy there is Involvement of patient's muscle.	2. Force is not applied	2. Force is applied	3. It is specially used as post operative therapy	3. It is used as routine therapy	4. Types are Knee joint Shoulder joint	4. Types are Cervical traction Lumber Traction	<b>04</b>
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	b)	<p><b>What are the technical specifications of nerve muscle stimulator?</b> <b>Ans : ( any four )</b></p> <ol style="list-style-type: none"><li>1. Power supply- 230V, 50Hz.</li><li>2. Output voltage- 0 to 150v.</li><li>3. Output current- up to 80mA.</li><li>4. Variable pulse duration- 0.3,1,10,30,100,300 msec.</li><li>5. Pulse repetitive duration - 0.3,1,3 up to 10 msec.</li><li>6. Surged faradic frequency- 6 to 60 surges/min.</li></ol>	<b>04</b>										
	c)	<p><b>State the contraindications of cold therapy.</b> <b>Ans:</b></p> <ol style="list-style-type: none"><li>1. <b>To be avoided in elder patients:</b> It should not be used to particularly the elder patients as it may create discomfort to them.</li><li>2. <b>To be avoided in cardiac conditions:</b> 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.</li><li>3. <b>To be avoided in peripheral nerve injuries:</b> 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.</li><li>4. <b>Peripheral vascular disease:</b> As cold application may reduce an already inadequate blood supply ice is avoided.</li></ol>	<b>04</b>										
	d)	<p><b>Describe any two methods for accident prevention.</b> <b>Ans:</b></p> <ol style="list-style-type: none"><li>1. <b>Grounding:</b> Is one of the most frequently method used for accident prevention. The principle of this method is to make grounding resistance small enough that for all fault resistance values, majority of fault current by passes body of the victim &amp; body current remains at safe level even if contact &amp; body resistances are small.</li><li>2. <b>Double Isolation:</b> In this method, fault resistance is very large. Double isolated equipment need not be grounded. It is widely used as method of protection in hand held power tool &amp; electric powered garden equipment e.g. lawn mowers.</li><li>3. <b>Protection by low voltage:</b> A low operating voltage can be obtained by means of step down transformer, in addition to bowering the voltage; the transformer provides isolation of supply voltage from ground.</li><li>4. <b>Ground fault circuit interrupter:</b> All current that enters a device through hot wire returns through neutral wire. Current actually return through body of victim &amp; through ground, in this method difference between the currents in the hot and neutral wires of</li></ol>	<b>04</b>										

		power line is an electric amplifier. If this difference exceeds a certain value, usually 5 mA, power is interrupted by a circuit breaker. In case of large current flow through body of victim, no harmful effects are encountered.	
	e)	<p><b>Write fault finding procedure of electrosurgical unit.</b></p> <p><b>Ans:</b></p> <ol style="list-style-type: none"> <li>1. Check power cable continuity.</li> <li>2. Check the fuse continuity.</li> <li>3. Check the power ON/OFF switch.</li> <li>4. Check the output of power supply circuit.</li> <li>5. Check output of at patient electrode.</li> <li>6. Check the output of logic &amp; control circuit.</li> <li>7. Check the output of foot switch.</li> </ol>	<b>04</b>
	f)	<p><b>Describe the procedure for testing of grounding system for leakage current.</b></p> <p><b>Ans:</b></p> <p>Ground resistance can be measured by passing up to 1 A through the ground wire and measuring the voltage between ground and neutral. Ground or neutral resistance should not exceed 0.2ohm. This gives an OK reading when the ground and neutral wires are transposed and when phase wires are connected to load and black wire is grounded.</p>	<b>04</b>
<b>3.</b>		<b>Attempt any <u>FOUR</u>.</b>	<b>16</b>
	a)	<p><b>Draw the constructional diagram of UV lamp &amp; state why quartz tube is used in it.</b></p> <p><b>Ans:</b></p> <div style="text-align: center;"> <p><b>Fig: Constructional diagram of UV lamp</b></p> </div> <p><b>Significance of quartz tube:</b></p> <ol style="list-style-type: none"> <li>1. This material allows the passage of UV radiations.</li> <li>2. It can withstand very high temperature.</li> <li>3. It has very low coefficient of expansion.</li> </ol>	<b>02</b>
	b)	<p><b>State and explain any four effects of short wave on human body.</b></p> <p><b>Ans:</b></p> <ol style="list-style-type: none"> <li><b>1. Increased metabolic activity:</b> Heating treatment given through SWD can accelerate rate of metabolism, it is more in the superficial tissues.</li> <li><b>2. Increased blood flow:</b> Increased blood supply ensures the optimum conditions for muscle contraction.</li> <li><b>3. Heating of nerves creating sedative effects:</b> Heat appears to produce sedative effects due to heating of nerves.</li> <li><b>4. Heating of muscles and tissues results in muscles relaxation:</b> Rise in temperature includes muscle relaxation and increases the efficiency of muscle action.</li> </ol>	<b>04</b>

c)

**Write any four safety precaution while handling cautery machine.**

**Ans:**

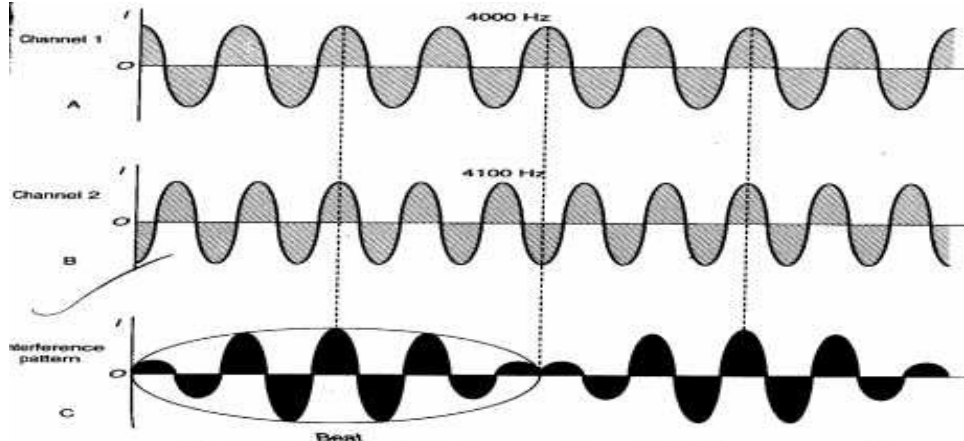
1. Main risk associated with electro surgery are burns, electrical interference with heart muscles ventricular fibrillation, danger of explosion cause by sparks, high frequency current hazards.
2. The main predominant hazard related to ESU is burns. Burns are caused by excess current density. It usually occurs at passive electrode because of failure to achieve adequate contact. It can also be caused due to unintended current path may be created by touching a grounded object .the risk of burns also exist in the presence of moisture.
3. Abnormal power setting indicates that there is something wrong. The indifferent electrodes, all cables and connectors should be thoroughly checked. It is better to carry surgical work with power settings as low as possible.
4. Proper clearance should be maintained between the active electrode and the patient when it is not in use.
5. Another serious hazard associated with ESU is the possibility to electrocution of the patient by faulty mains operated equipment.
6. In order to provide protection against faulty mains supply the O/P configuration should be done in proper ways. There are 3 different ways of O/P configurations are in the earth O/P system, the passive electrodes connected conductively to protective earth, the earth reference system uses a capacitor to connect the passive electrode to earth, the isolated system in which the return electrode is floating.

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d)

**Explain the significance of interferential therapy. Draw neat waveforms for the same.**

**Ans:**



> Fig. 29.11 Principle of generation of interference currents

**Fig: Waveforms for the interferential therapy**

**Significance :**

Interferential Therapy is a form of electrical treatment in which to midium frequency currents are used to produce low frequencies currents. The basic principal is when two midium frequency currents crosses in patients tissue it produces interference effect in that tissue. In this method one current is kept at contance frequency 4000 Hz. and second can be ajustable from 4000 to 4400 Hz. When fixed and adjustable frequency are combine they produces deisre beat frequency as shown in wave form. The beat frequency is equal to the difference in between frequency of two currents. The convenstional stimulator delivers most of the stimulations directly under electords but with interfentional stumilator the currents passes at greater depth and over a larger valoume of tissue. As the midium frequency current is tollarated better by the skin the theory can be used for longer time.

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	e)	<p><b>Describe any four application technique of cold therapy.</b>  <b>Ans:</b>  <b>Application technique :</b>  <b>1. Ice towels:</b> Prepare the ice solutions by filling a bucket with crushed ice to one part water. In This solution towel is immersed and applied over the body part to be treated.  <b>2. Ice packs:</b> Crushed ice may be placed inside a specially made terry-towel bag or an ice towel folded into an appropriate shape. The part to be treated is exposed and put into comfortable position and ice pack is to be treated.  <b>3. Immersion:</b> In this technique the part which is to be treated is immersed in an ice solution.  <b>4. Ice-cube massage:</b> A large block of ice can be wrapped in a towel and can be applied over the part to be treated.  <b>5. Excitatory cold:</b> The sensory stimulus of ice on skin may be used to facilitate contraction of inhibited muscles.</p>	04
4.	(A)	<p><b>Attempt any <u>THREE</u></b></p>	12
	a)	<p><b>Name the application technique of short wave diathermy (SWD) machine which is used if the elbow joint of patient is to be treated. Explain with neat diagram.</b>  <b>Ans:</b>  For treating the elbow joint capacitive or condenser field or plate technique is to be used.  <b>Capacitive or condenser field or plate method</b>  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 take place due to the rotation of dipoles &amp; the vibrations of the ions in the tissue fluids and molecular distortion in the tissues.</p> <div style="text-align: center;"> <p><b>Fig: Capacitive method</b></p> </div>	01 01 02
	b)	<p><b>Mention effect of electric current on human muscle.</b>  <b>Ans:</b>  If a normal muscles or motor nerve is stimulated with a current of adequate intensity. It results in its contraction when there is disease or injury of motor nerve or muscle alterations are liable to occur in their response to electrical stimulation. The change the electrical response may be of considerable help in the diagnosis of certain diseases affecting them. These changes themselves in that a higher or lower current intensity than</p>	





		normal is required to bring about a muscle contraction. It is therefore possible to determine the degeneration and regeneration processes in nerve and muscle system by the use of stimulation current technique. The biological reaction produced low voltage current has resulted in the adaption of this therapy in the management of many diseases affecting muscles and nerves. The electric currents are used for treatment of paralysis with totally or partially degenerated muscles, for the treatment of pain and peripheral circulatory disturbances and for several other applications.	04
c)	<b>Write any four medical applications of LASER.</b> <b>Ans:</b> <b>1. Tissues Healing</b> 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. <b>2. Pain control</b> Laser therapy is used for relief of acute and long term pain, It can be used for treating of Rheumatoid arthritis. <b>3. Osteoarthritis</b> 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. <b>4. Retinal Coagulation</b> The heat generated by laser results in retina being attached with the choroid. <b>5. Measurement of eye activity</b>	04	
d)	<b>Describe the principle of interference therapy.</b> <b>Ans:</b> Interferential Therapy is a form of electrical treatment in which to medium frequency currents are used to produce low frequency currents. The basic principal is when two medium frequency currents cross in patient tissue it produce interference effect in that is use. In this method one current is kept at constant frequency 40000Zh. And second can be adjustable from 4000 to 4400 Zh. When fixed and adjustable frequency are combine they produces desire beat frequency as shown in wave form. The beat frequency is equal to the difference in between frequency of two currents. The conventional stimulator delivers most of the stimulations directly under electrodes but with interferential stimulator the currents passes at greater depth and over a larger volume of tissue. As the medium frequency current is tolerated better by the skin the therapy can be used for longer time. IFC are produced by using two channel stimulators and four electrodes as shown in figure A A' & B B' The current of two different frequencies applied at two electrodes interference with each other in the tissues.	04	
(B)	<b>Attempt any <u>ONE</u></b>	06	
a)	<b>State the principle of electrosurgery machine and list the technical specification of electrosurgery machine (any three).</b> <b>Ans:</b> It is application of high frequency electric current through the biological tissue. It can be used to cut coagulate desiccated or fulgurate the tissue .Its benefit include 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 I to the tissue, there is high concentration of current occur at that point. The tissues are heated to such an extent the cells which are immediately under	03	

the electrode are torn apart by the boiling of the cell fluid. Two electrodes are connected to the RF generator, one is active and other is passive. Active electrode has very small cross sectional area. It is made in form of needle or probe. The passive electrode has much larger area than the active electrode it is the order of 100 cm<sup>2</sup>. 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. 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.

**Technical specification of electrosurgery machine**

1. Input power- 230 V, 50 Hz
2. Frequency of operation – 250KHz – 1MHz
3. Power delivering output – 400w for cutting and 150w for coagulation
4. Coagulation duration – 10-15 sec

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b) **Explain the principle of high frequency heating with neat diagram. Differentiate between short wave and microwave diathermy on the basis of**

**i) Wavelength**

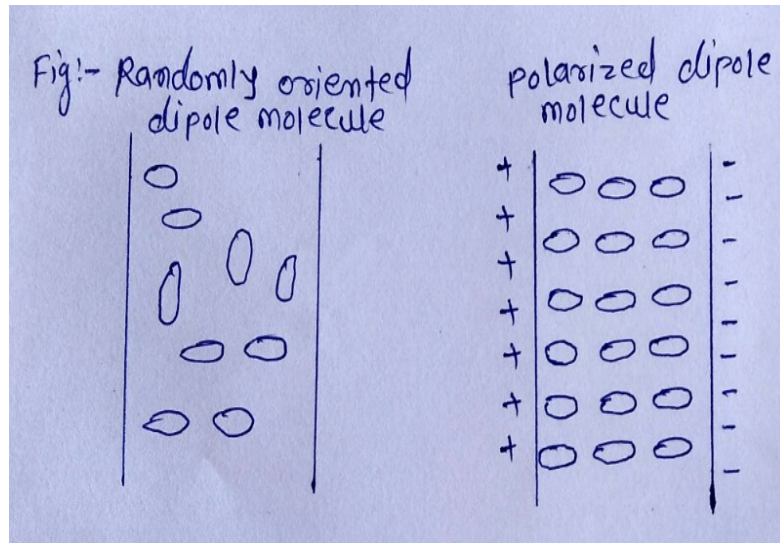
**ii) Application**

**Ans:**

**Principle of high frequency heating:**

It is based on the fact that the dipole molecules of the body are normally placed randomly. Under the influence of an electric field they rotate according to the polarity of electric field. If the polarity of electric field is changing the dipole molecules try to orient themselves according to changing polarities of electric field. This result in the large inters molecular movement or friction which ultimately results in heating of that body. The use of high frequency energy has the advantage of considerable penetration as compared to simple heat application. Thus it can be used for deeper laying tissues such as muscles, bones etc.

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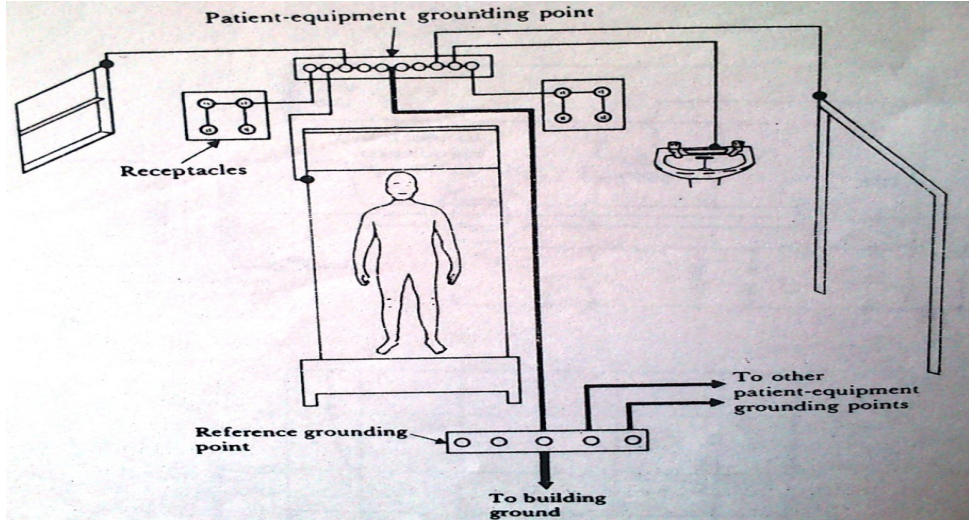
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**Fig: Diagram of high frequency heating**

**Table: Difference between short wave and microwave diathermy**



Sr. No.	Parameter	Shortwave Diathermy	Microwave Diathermy	
1	<b>Wavelength</b>	3meters to 30 meters For therapeutic purpose 1 lmts	1 cm to 100 cm For therapeutic purpose 12.25cm, 69 cm	<b>02</b>
2	<b>Application</b>	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.	
<b>5.</b>		<b>Attempt any <u>FOUR</u></b>		<b>16</b>
a)	<b>State the need of traction treatment.</b> <b>Ans:</b> In orthopedic medicine traction refers to the set of mechanism for straightening broken bones or reliving pressure on the spine & skeletal system. The need of traction treatment, 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>04</b>
b)	<b>State and explain any four effects of short wave on human body.</b> <b>Ans:</b> <b>1. Increased metabolic activity:</b> Heating treatment given through SWD can accelerate rate of metabolism, it is more in the superficial tissues. <b>2. Increased blood flow:</b> Increased blood supply ensures the optimum conditions for muscle contraction. <b>3. Heating of nerves creating sedative effects:</b> Heat appears to produce sedative effects due to heating of nerves. <b>4. Heating of muscles and tissues results in muscles relaxation:</b> Rise in temperature includes muscle relaxation and increases the efficiency of muscle action.			<b>04</b>
c)	<b>Prepare the installation procedure for nerve muscle stimulator.</b> <b>Ans:</b> 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.			<b>04</b>
d)	<b>Explain application techniques of cold therapy.</b> <b>Ans:</b> <b>1. Ice towels:</b> Prepare the ice solutions by filling a bucket with crushed ice to one part water. In This solution towel is immersed and applied over the body part to be treated. <b>2. Ice packs:</b> Crushed ice may be placed inside a specially made terry-towel bag or an ice towel folded into an appropriate shape. The part to be treated is exposed and put into			

	<p>comfortable position and ice pack is to be treated.</p> <p><b>3. Immersion:</b> In this technique the part which is to be treated is immersed in an ice solution.</p> <p><b>4. Ice-cube massage:</b> A large block of ice can be wrapped in a towel and can be applied over the part to be treated.</p> <p><b>5. Excitatory cold:</b> The sensory stimulus of ice on skin may be used to facilitate contraction of inhibited muscles.</p>	04
e)	<p><b>State the concept of electrostatic discharge.</b></p> <p><b>Ans:</b> Electrostatic discharge (ESD) is the release of static electricity .ESD first requires a buildup of an electrostatic charge. This occurs when two different materials rub together. One of the materials becomes positively charged; and the other becomes negatively charged. The positively charged material now has an electrostatic charge .When that charge comes into contact with right material .it is transferred and we have an ESD event. Heat from the event is extremely hot although we do not feel it when we are shocked. However when the charge is released on electronic device such as expansion card, the intense heat from the charge can melt or vaporize the tiny parts in the cards causing the device to fail. For example, hard drive components are sensitive to only 10v .For this reason, manufacturers of electronic devices incorporate measures to prevent (ESD).Sensitive devices can be packed with materials that shield the product from a charge. Examples of ESD like the shock we receive when we walk across carpet and touch a metal doorknob and the static electricity we feel after drying clothes in clothes dryer. While most ESD events are harmless, it can be an expensive problem in many industrial environments.</p>	04
f)	<p><b>Draw a neat diagram for test of grounding system in patient care area and explain.</b></p> <p><b>Ans:</b></p>  <p><b>Fig: Grounding system in patient care area</b></p> <p>All the receptacle grounds and conductive surfaces in the vicinity of the patient are connected to patient equipment grounding point. Each patient's equipment grounding point is connected to reference grounding point that makes a single connection to the building ground. The voltage between the reference grounding point and exposed conductive surfaces should not exceed 20 mV. The limit is 500 mV for general care areas and 40 mV for critical care areas. The impedance between the reference grounding point and receptacle grounding contacts must be less than 0.1Ω to 0.2Ω.</p>	02  02



6.		<b>Attempt any <u>FOUR</u></b>	<b>16</b>										
	a)	<p><b>Write the installation steps of ultrasound therapy machine.</b> <b>Ans:</b> 1. Unpack the instrument 2. Check all the accessories of instrument 3. Check the instrument for any damage 4. Place the instrument on vibration free and dust free plane surface 5. Connect all the accessories to instrument 6. Switch on the instrument 7. Calibrate the instrument. 8. Take a performance test.</p>	<b>04</b>										
	b)	<p><b>What is microshock and macroshock? State their range.</b> <b>Ans:</b> <b>Microshock:</b> In this case current passes directly through the heart wall (Internal part of body). In this case small amount of current cause very dangerous to the person. Micro current applied internally to the body. In this case directly current pass through the heart. Therefore less current to produce ventricular fibrillation. Such situations are commonly generated in hospital. <b>Range:</b> The dangerous level of current directly applied to the heart could be as low as 10 microamperes. <b>Macroshock:</b> In macroshock or gross shock current flows through the external body parts of person ex. Hand, Foot. Macroshock will be generated by the person accidental contact with electrified object at any point on the surface of body. The majority accident involves or develops passage of current from one upper limb to the feet. The value of electric current flowing through the body varies from person to person. The value of current depend upon the contact impedance, age, weight, condition of skin, sex, frequency of current, duration of current etc. <b>Range:</b> The dangerous current level of 10 milli amperes stated above is for a macro shock hazard.</p>	<b>01</b> <b>01</b> <b>01</b> <b>01</b>										
	c)	<p><b>Differentiate between UV and IR lamp (Any four points).</b> <b>Ans:</b></p> <table border="1" data-bbox="289 1394 1419 1803"> <thead> <tr> <th data-bbox="289 1394 854 1434">UV Lamp</th> <th data-bbox="854 1394 1419 1434">IR Lamp</th> </tr> </thead> <tbody> <tr> <td data-bbox="289 1434 854 1474">1. UV lamps emit UV radiations.</td> <td data-bbox="854 1434 1419 1474">1. IR lamps emit IR radiations.</td> </tr> <tr> <td data-bbox="289 1474 854 1619">2. It consists of U shaped quartz tube or burner which acts as a point source.</td> <td data-bbox="854 1474 1419 1619">2. It consist of a coil wound on a cylinder which is made up of an insulating material Then electric current is passed through the wire and IR rays are emitted.</td> </tr> <tr> <td data-bbox="289 1619 854 1732">3. Time required by the UV lamps to emit the UV radiations of required wavelength is 5 minutes.</td> <td data-bbox="854 1619 1419 1732">3. Time required by the IR lamps to emit the IR radiations of required wavelength is 5-15 minutes.</td> </tr> <tr> <td data-bbox="289 1732 854 1803">4. It emits the UV radiation in the range of 280-400nm.</td> <td data-bbox="854 1732 1419 1803">4. It emits the IR radiations in the range of 750nm-1500nm.</td> </tr> </tbody> </table> <p style="text-align: center;"><b>Table: Difference between UV and IR lamp</b></p>	UV Lamp	IR Lamp	1. UV lamps emit UV radiations.	1. IR lamps emit IR radiations.	2. It consists of U shaped quartz tube or burner which acts as a point source.	2. It consist of a coil wound on a cylinder which is made up of an insulating material Then electric current is passed through the wire and IR rays are emitted.	3. Time required by the UV lamps to emit the UV radiations of required wavelength is 5 minutes.	3. Time required by the IR lamps to emit the IR radiations of required wavelength is 5-15 minutes.	4. It emits the UV radiation in the range of 280-400nm.	4. It emits the IR radiations in the range of 750nm-1500nm.	<b>04</b>
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d) Suggest the possible solution and state cause for the following faults on ESU (Electro Surgical Unit).

Ans:

Faults	Cause	Solution
1) Deactivation of alarm tones.	Loose or damaged connection between speaker board and main circuit board	Check connection/ Replace the faulty speaker
2) Mode buttons do not operate.	Loose or disconnected cable between main circuit board and display board	Check connection/ cable Replace the chord
3) Electric shock	Leakage current, open power chord may be touching to metal body, faulty grounding	Check connection /cable grounding system
4) Non-responding foot switch's output.	Loose or damaged connection between machine and foot switch	Check connection/ cable Replace the chord

04

e) State different methods of cutting and coagulation and explain any two with neat diagram.

Ans:

1. Cutting or Electrotomy
2. Coagulation
3. Fulguration
4. Desiccation

**1. Cutting or Electrotomy:** 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 Tissue gets torn apart. Needle type electrode is used for this purpose.

**2. 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.

**3. 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.

**4. 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.

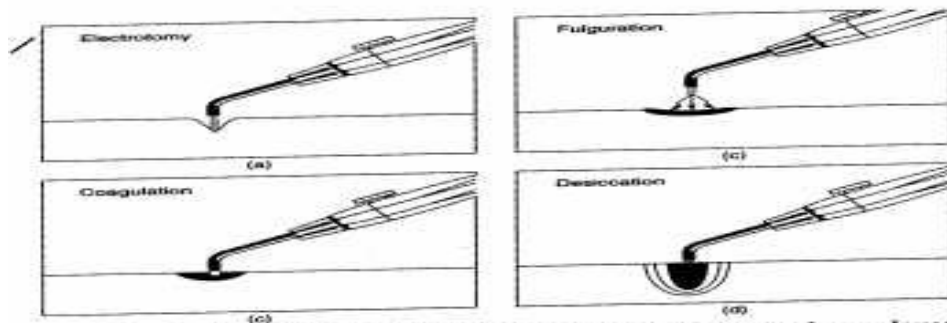


Fig. 27.2 Various types of electro-surgery techniques commonly employed in practice

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Fig: Different methods of cutting and coagulation