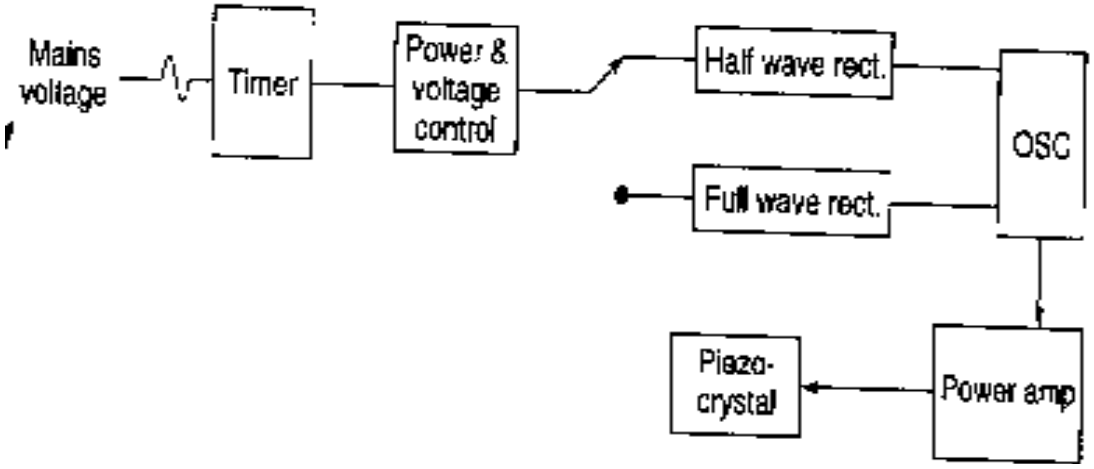
SUMMER – 2019 EXAMINATION

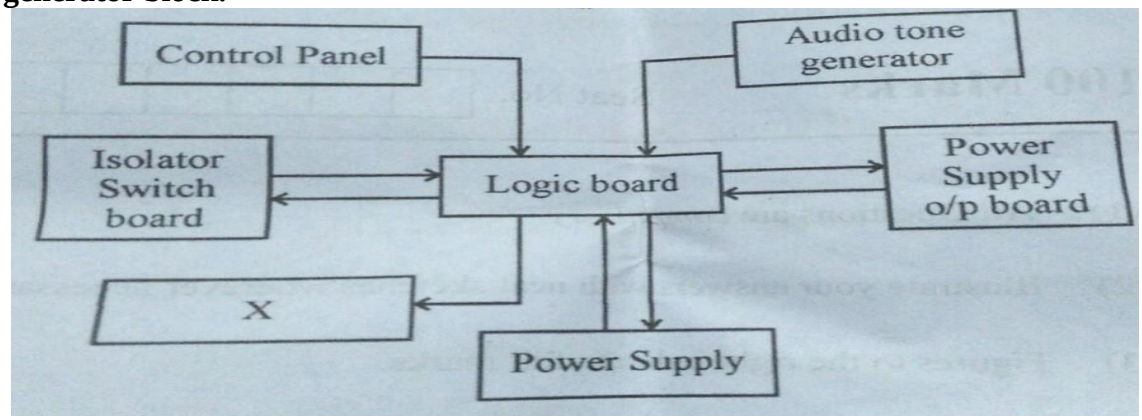
Subject Name: Therapeutic Equipment **Model Answer** **Subject Code:** 17671

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 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.

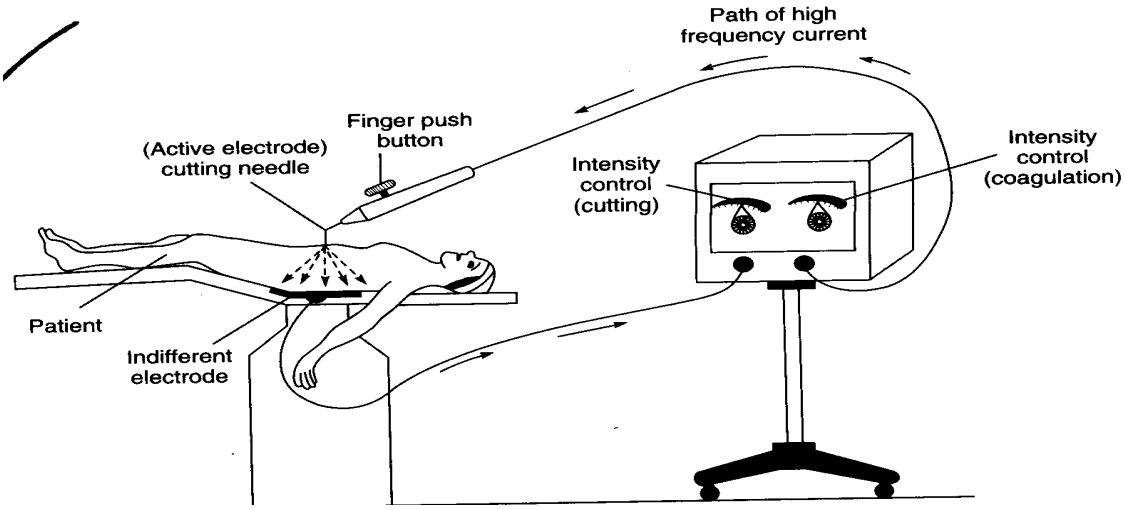
Q. No.	Sub Q. N.	Answer	Marking Scheme
1.	A)	**Attempt any THREE**	**12 M**
	a)	**List any four properties of LASER.** **Ans:** **Properties of LASER:** 1. Monochromatic: Narrow wavelength 2. Coherent: It has same phase and has same direction 3. High power density 4. Collimated beam: Parallel beam 5. High power output 6. Unidirectional: Its direction is same	**04 M**
	b)	**State the need of Continuous Passive Movement.** **Ans:** **Need of Continuous Passive Movement:** 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.	**04 M**
	c)	**Explain one application technique of applying ultrasonics to the body.** **Ans:** **Application technique of applying ultrasonics to the body:** 1. **Direct contact** 2. **Water bath** 3. **Water bag** 1. **Direct contact:** If the surface to be treated is fairly regular than a coupling medium is applied to the skin in order to eliminate air between the skin and the treatment head (probe). So as to transmit ultrasonic beam from the treatment head to the tissues. For this method body	**04 M**

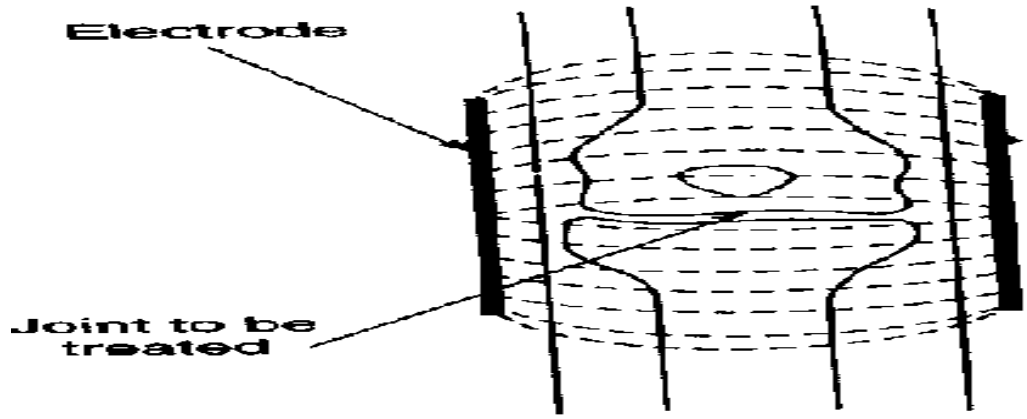
		part must be sufficiently smooth and uninjured. A treatment head is moved in small concentric circles over the skin in order to avoid concentration at any point in order to avoid concentration at any point keeping the transducer plate in contact with the skin. If possible larger areas should be divided and each area is treated separately. In case of longer areas probe should be moved up and down to obtain uniform distribution of ultrasonic energy. 2. **Water bath:** 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. An ordinary tap water may create problem the air bubbles can dissociate from the bottom and accumulate from the patient's skin and reflect the ultrasonic beam. To avoid this frequent cleaning must be needed. 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 patient's body. In this method the controlling of the exact amount of doses is difficult. 3. **Water bag:** 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. In this method some problem of attenuation of ultrasonic wave may occur.	
	d)	**State and explain the principle of cold therapy.** **Ans:** **Principle of cold therapy:** 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.	**04 M**
	B)	**Attempt any <u>ONE</u>**	**06 M**
	a)	**Draw block diagram of Ultrasonic Therapy Unit. List the two modes of operation of the machine given. From the block diagram. Name the two blocks which are responsible for switching the mode of operation.** **Ans:**  **Fig: Ultrasonic Therapy Unit**	**02 M**

		Modes of operation: 1. Pulse mode 2. Continuous mode **Blocks which are responsible for switching the mode of operation:** 1. Half wave rectifier 2. Full wave rectifier	**02 M** **02 M**
	b)	**Identify the block diagram shown, Label the block X and explain use of Audio tone generator block.**  **Ans:** **Fig:** Block diagram of Electro Surgical Unit **Block X:** Footswitch **Use of Audio tone generator block:** In order to facilitate the identification of each mode of operation the machines incorporate an audio tone generator.	 **02 M** **02 M** **02 M**
2.		**Attempt any <u>FOUR</u>**	**16 M**
	a)	**Name the post-operative treatment given for the patient. Enlist the two types of treatment under it.** **Ans:** **The post-operative treatment given for the patient:** CPM (Continuous passive movement) **Types of treatment under it:** 1. Knee joint 2. Shoulder joint 3. Wrist joint	 **02 M** **02 M**
	b)	**Explain principle of nerve and muscle stimulator.** **Ans:** **Principle of nerve and muscle stimulator:** Electrotherapy unit should give specific output waveform for specific applications. The unit gives output current wave forms to cover whole range of electrotherapeutic currents. The unit must be of constant voltage or constant current type. It is capable of generating different types of pulses at its output by using a selector switch. Galvanic current of required intensity is achieved by simple DC supply tapping circuit. Electric current is directly applied to a patient. To set basic stimulation frequency variable rate multivibrator M1 is used. The output from this M1 triggers monostable multivibrator M2 which sets pulse width. The output from M2 provides an interrupted galvanic. Another astable multivibrator M3 produces short duration pulses called faradic current. By modulating the faradic current with the required pulse duration we can get the surged faradic current. It is done in a mixer circuit. Triangular pulse generator is used to get exponentially progressive current. This is done by integrating the output of M2 so	 **04 M**

		that the interrupted galvanic pulses are modified to have exponential rise and fall.	
	c)	**State and explain application techniques of cold therapy. (any two)** **Ans:** **Application techniques of cold therapy:** 1. **Ice towels:** 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. 2. **Ice packs:** 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. 3. **Immersion:** In this technique the part which is to be treated is immersed in an ice solution. 4. **Ice-cube massage:** A large block of ice can be wrapped in a towel and can be applied over the part to be treated. 5. **Excitatory cold:** The sensory stimulus of ice on skin may be used to facilitate contraction of inhibited muscles.	**04 M**
	d)	**Enlist any four causes of electric shock.** **Ans:** **Causes of electric shock:** 1. Faulty appliances. 2. Damaged or frayed cords or extension leads. 3. Electrical appliances coming in contact with water. 4. Incorrect or deteriorated household wiring. 5. Downed powerlines. 6. Lightning strike.	**04 M**
	e)	**Define Maintenance and explain the maintenance steps which are carried out for electro surgical unit.** **Ans:** **Definition of Maintenance:** Maintenance is an organized activity designed to prevent the wear and tear or sudden failure of equipment components. **Maintenance steps of electro surgical unit:** 1. Cleaning of ESU Machine. 2. Check calibration of instrument. 3. Check electrical safety instrument. 4. Check all cables. 5. Mechanical inspection of instrument 6. Check the power supply to the machine 7. Check the electrodes 8. Check the cable for any damage 9. Check the proper grounding of the machine 10. After use carefully remove electrodes. 11. Clean electrodes after use 12. Store electrodes in dry place 13. Check mains plug screws are tight. 14. Check all switches operate correctly. 15. Every six months biomedical technician check required. 16. Tighten any lose screws and check parts are fitted tightly. 17. Clean electrodes. 18. Wipe dust off exterior and cover equipment after use.	**02 M** **02 M**

	f)	**Describe the concept of ESD.** **Ans:** 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.	**04 M**
3.		**Attempt any <u>FOUR</u>**	**16 M**
	a)	**List any four medical applications of any laser.** **Ans:** **Medical applications of any laser:** 1. **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. 2. **Pain control:** Laser therapy is used for relief of acute and long term pain, It can be used for treating of Rheumatoid arthritis. 3. **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. 4. **Retinal Coagulation:** The heat generated by laser results in retina being attached with the choroid. 5. **Measurement of eye activity:** Laser is used for measurement of eye activity.	**04 M**
	b)	**Enlist any four important technical specifications of ultrasound therapy machine.** **Ans:** **Technical specifications of ultrasound therapy machine:** 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 cm2	**04 M**
	c)	**With neat labeled diagram explain principle of surgical diathermy machine.** **Ans:** 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 .Its benefit include ability to make precise cut with limited blood loss. The basic principle behind the ESU is as shown. 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	**02 M**

		form of needle or probe. The passive electrode has much larger area than the active electrode it is the order of 100 cm^2. 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.  **Fig: Surgical diathermy machine**	**02 M**
	d)	**Define 'Installation'. Enlist various installation steps carried out in nerve muscle stimulator.** **Ans:** **Definition of Installation:** Installation can be defined as fulfilling all the requirement of machine to work it satisfactory. The requirements are may be common or specific depending upon type machine. **Installation steps in nerve muscle stimulator:** 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.	**02 M** **02 M**
	e)	**State the contraindications of cold therapy. (any four)** **Ans:** **Contraindications of cold therapy:** 1. **To be avoided in elder patients**: 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.	**04 M**

		4. **Peripheral vascular disease:** As cold application may reduce an already inadequate blood supply ice is avoided.	
4.	**A)**	**Attempt any <u>THREE</u>**	**12 M**
	a)	**Enlist the two methods of applying electrodes in short wave diathermy treatment and explain any one with neat diagram.** **Ans:** **Methods of applying electrodes in short wave diathermy treatment:** 1. Capacitive method 2. Inductive Method 1. **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 take place due to the rotation of dipoles and the vibrations of the ions in the tissue fluids and molecular distortion in the tissues.  **Fig: Capacitive method** 2. **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 patient body where plate electrodes are inconvenient to use. When RF current is passed through this cable the heating is produced inside the body.	**01 M** **01 M** **02 M**

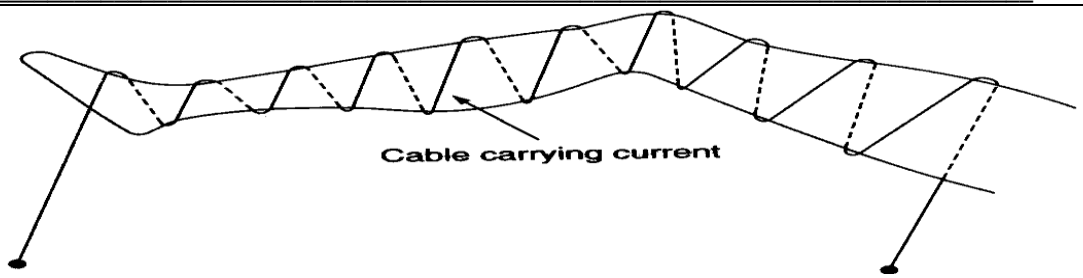


Fig: Inductive Method

b) State the effect of electric current on nerve and muscles. — **04 M**

Ans:

Effect of electric current on nerve and muscles:

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 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.

c) Draw and explain principle of operation of UV lamp. — **02 M** + **02 M**

Ans:

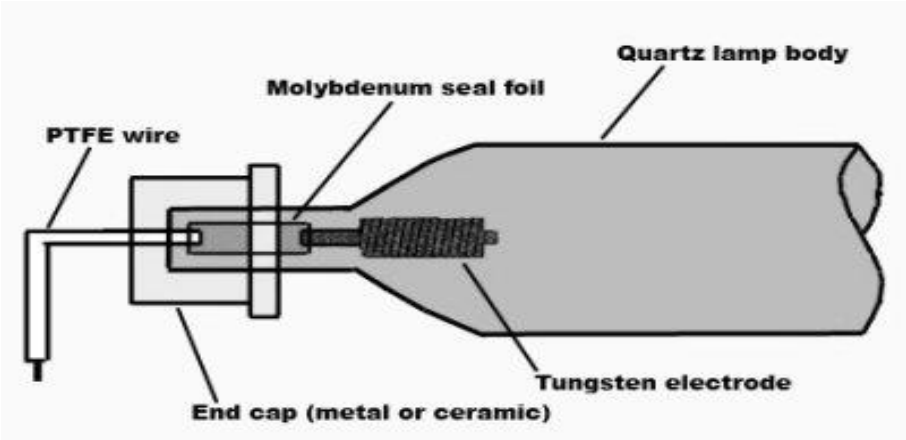
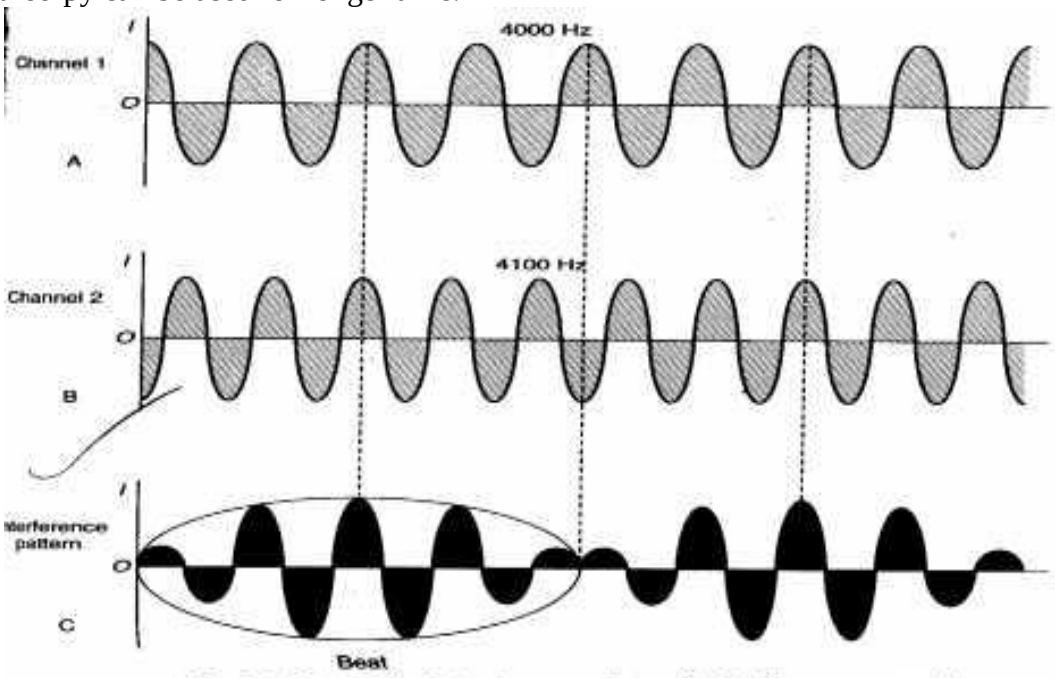
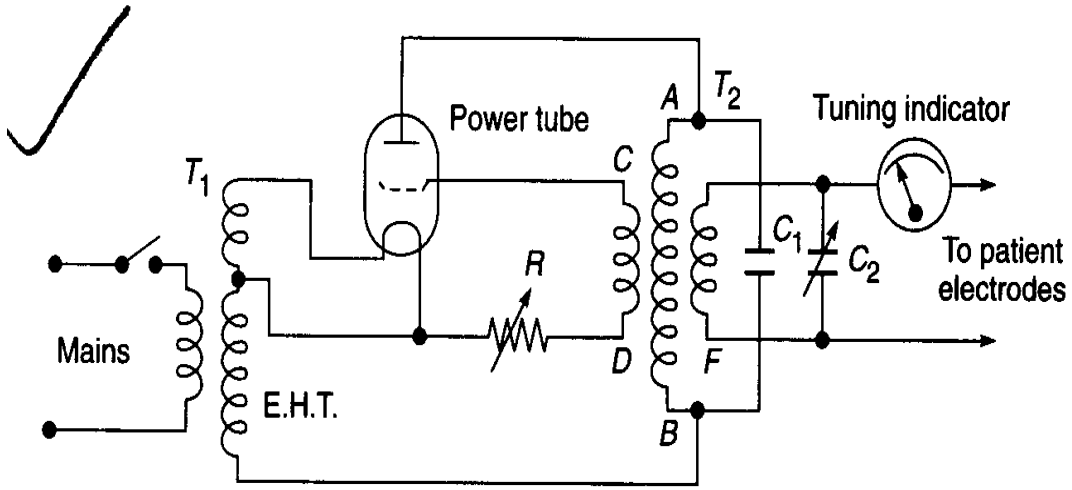
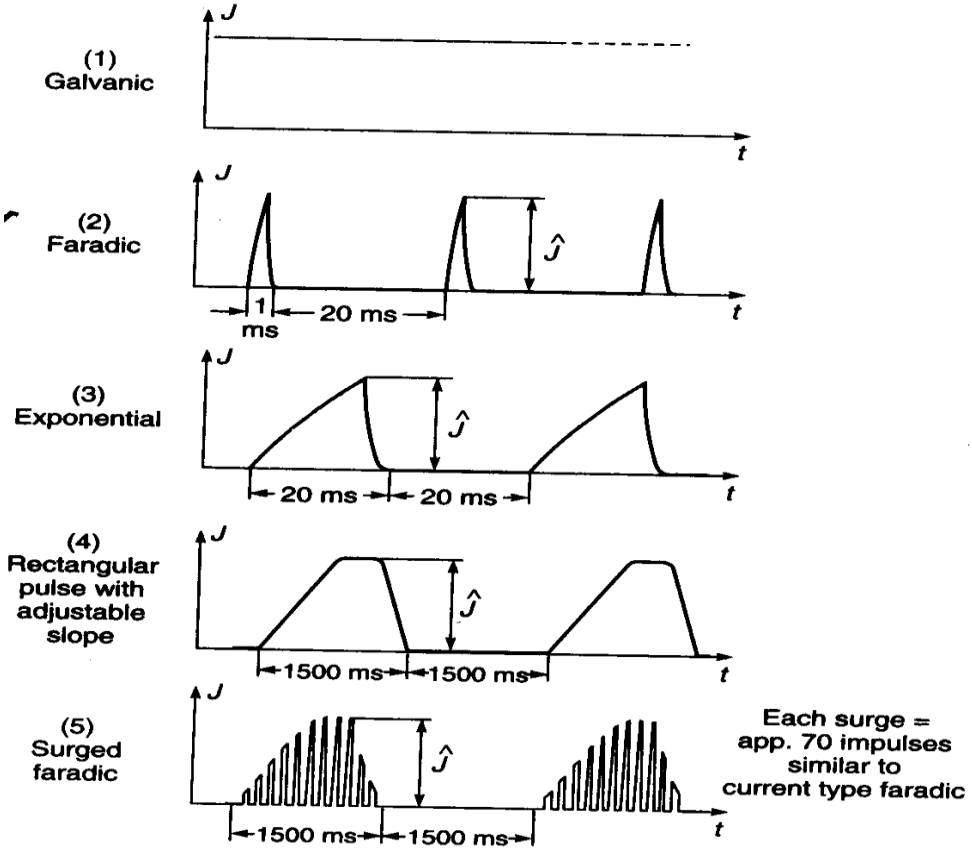


Fig: UV lamp

It consists of 'U' shape quartz tube. It allows the passage of UV radiation can withstand very high temperature and has low coefficient of expansion. The tube is filled with argon gas at low pressure a small quantity of mercury is also enclosed in the tube. An electrode is sealed on the either ends of the tube. Argon gas is extremely stable and inert high amount of energy is required to ionize the argon gas. It is obtained by applying high voltage (400V) from an autotransformer across a tube for a fraction of seconds. Once the argon has been ionized normal AC mains voltage is applied across the tube. When argon gas is ionized there are number of free electrons which can move randomly inside the tube. It will cause collision between free electrons and mercury atoms as well as free electrons and neutral argon atoms, which causes further ionization current across the tube. This current flow can be seen as a glow discharge.

	d)	**With neat labeled waveforms explain the principle of interference therapy.** **Ans:** Interferential Therapy is a form of electrical treatment in which to midium frequency currents are used to produce low frequesncy currents. The basic principal is when two midium frequency currents crosses in patients tissue it produceses interference effect in that tisuue. 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 directely under electrods but with interfentioal 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 theorpy can be used for longer time.  ➤ Fig. 29.11 *Principle of generation of interference currents* **Fig: Principle of interference therapy**	**02 M** **02 M**
	B)	**Attempt any <u>ONE</u>**	**06 M**
	a)	**What is range of high frequency of currents used in surgical diathermy? Enlist different methods of cutting and coagulation. Also, explain the same.** **Ans:** **Range of high frequency of currents used in surgical diathermy:** 01 to 03Mz **Enlist different methods of cutting and coagulation:** 1. Cutting or Electrotomy 2. Coagulation 3. Fulguration 4. Desiccation **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. **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.	**01 M** **01 M**

		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.	**04 M**
	b)	**Enlist three different types of Diathermy and explain basic principle of working of short wave diathermy along with a neat diagram.** **Ans:** **Types of Diathermy:** 1. Short Wave Diathermy 2. Micro Wave Diathermy 3. Long Wave Diathermy	**02 M**
			**02 M**
		Fig: Short Wave Diathermy Short Wave diathermy current is a high frequency alternating current. The heat energy obtained from the wave is used for giving relief to the patient. Its frequency is 27,120,000 cycles per second and the wavelength is 11 meter. The method consists of applying the output of radio frequency oscillator to a pair of electrodes which are positioned on the body over the region to be treated. When high frequency is applied across electrodes molecules try to orient in the direction of current which creates inter molecular friction and hence the heat is generated inside the body. The RF energy heats the tissues and promotes healing of injured tissues and inflammations.	**02 M**
5.		**Attempt any <u>FOUR</u>**	**16 M**
	a)	**Suggest application technique of ultrasound therapy for** **1. Irregular Surface** **2. Injured Body Part** **Ans:** **Application technique of ultrasound therapy:** **For irregular surface:** Water Bag **Injured body part:** Water bath	**02 M** **02 M**
	b)	**Enlist any four technical specifications of microwave diathermy.** **Ans:** **Technical specifications of microwave diathermy:** 1. Power supply: 250V, 50Hz 2. Frequency: 2450 MHz	**04 M**

		3. Wavelength: 122.5 mm 4. Duration of treatment: 20 min.	
	c)	**Draw any four current waveforms normally employed in electrotherapy and explain any one in detail.** **Ans:** **Galvanic current:** It may be used for the preliminary treatment of autonic paralysis (muscles are completely deactivated or weak) and for the treatment of disturbance in blood flow. It is also used for introphoresis (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 0.3-0.5mA/cm2 of electrode surges. **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. **Exponentially progressive current:** It does not stimulate the surrounding healthy tissue. This current is useful for the treatment of functional paralysis. **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 pain and for the odema and inflammation. **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.  **Fig: Current waveforms**	**02 M** **02 M**
	d)	**Enlist any four physiological effects of cold therapy.** **Ans:** **Physiological effects of cold therapy:** 1. Circulatory response 2. Neural response 3. Reduction of pain	**04 M**

		4. Reduction of spasticity 5. Excitatory cold	
	e)	**Define the terms:** **i. Micro shock** **ii. Macro shock** **Ans:** **Micro shock and macro shock:** **Micro shock:** 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. **Macro shock:** In macro shock 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.	**02 M** **02 M**
	f)	**Describe any two methods of Accident prevention.** **Ans:** **Methods of Accident prevention:** **Grounding:** 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 & body current remains at safe level even if contact & body resistances are small. **Double Isolation:** 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 & electric powered garden equipment e.g. lawn mowers. **Protection by low voltage:** 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. **Ground fault circuit interrupter:** All current that enters a device through hot wire returns through neutral wire. Current actually return through body of victim & through ground, in this method difference between the currents in the hot and neutral wires of 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.	**04 M**
6.		**Attempt any <u>FOUR</u>**	**16 M**
	a)	**Enlist the Installation steps carried out for Ultrasound Therapy Machine.** **Ans:** **Installation steps of Ultrasound Therapy Machine** : 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.	**04 M**

8. Take a performance test.

b) Explain physiological effects of electric current. **04 M**

Ans:

Physiological effects	Current range
Tingling sensation	01 mA
Muscle contraction	20 mA
Ventricular Fibrillation	100 mA
Respiration Paralysis	01 A
Severe burn	Above 06 mA

Table: Physiological effects of electric current

c) Differentiate between luminous and non- luminous IR generators on basis of any four points. **04 M**

Ans:

Luminous Generator	Non-Luminous Generator
It consists of a tungsten filament	It consists of coil wound on ceramic cylinder
Wavelength of light generated is 350-4000nm	Wavelength of light generated is 750-1500nm
It produces IR, visible and UV radiation	It produce only IR radiation
It requires 600- 1500 w power	It requires 750- 1000w power
It requires 5min pre heating time	It requires 5min- 15 min pre heating time

Table: Difference between luminous and non- luminous IR generators

d) Suggest possible solution for following faults of ESU. **04 M**

Fault **Solution**

i. **Equipment not turning on -**
ii. **Electrical shocks to user -**
iii. **Equipment on but output is absent or weak -**
iv. **Continuous Interference with Monitors –**

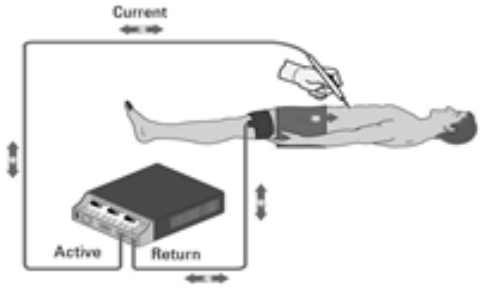
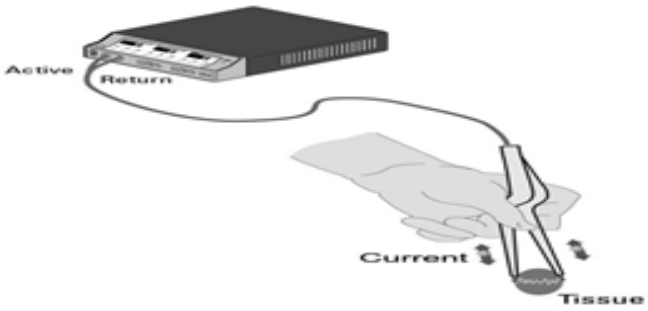
Ans:

Fault	Solution
Equipment not turning on	Check power switch is ON, Check mains power, Try cable on another piece of equipment.
Electrical shocks to user	Check connection or cable grounding system.
Equipment on but output is absent or weak	Replace cutting and coagulation electrode, Replace electrode cable, Replace foot switch.
Continuous Interference with Monitors	Replace monitor, Replace power cable, Check mains power supply.

e) Draw and explain unipolar and Bipolar mode of ESU. **01 M**

Ans:

Unipolar Mode: In Monopolar mode of electrosurgery, a small active electrode relative to the patient plate is used at the site of surgery. Electrical energy flows from the generator (ESU unit), to the active electrode (cautery pencil). The high current density produced at the active electrode creates a pronounced diathermic effect, causing tissue

		destruction at the operative site. The high current then passes through the patient to the patient plate, thus completing the electrical circuit. The patient plate's large size lowers the current density at its placement site, preventing unwanted burns shown in fig.  **Fig: Unipolar Mode** **Bipolar Mode:** A bipolar circuit uses two electrodes of equal size to create a dipole circuit. The bipolar circuit is the classical form of diathermic heating, in that the loss created in the dielectric is evenly dispersed between the electrodes. Bipolar electro surgery uses 2-tined bipolar forceps. One tip of the forceps serves as the active electrode, and the other tip serves as the return electrode. The electrical current is confined to the tissue between the tips of the bipolar forceps. A high current density is applied through bipolar forceps, coagulating the small amount of tissue contained between the tips of the forceps with minimal effect on surrounding tissue shown in fig.  **Fig: Bipolar Mode**	**01 M** **01 M** **01 M**
	f)	**List out maintenance steps for Nerve Muscle Stimulator.** **Ans:** **Maintenance steps for Nerve Muscle Stimulator:** 1. Cleaning of nerve muscle stimulator. 2. Check calibration of machine. 3. Check the power supply to the machine. 4. Check the cable for any damage. 5. Check the proper grounding of the machine. 6. After use carefully remove electrodes. 7. Clean electrodes after use. 8. Store electrodes in dry place. 9. Check all switches operate correctly. 10. Every six months biomedical technician check required. 11. Tighten any lose screws and check parts are fitted tightly. 12. Clean electrodes. 13. Wipe dust off exterior and cover equipment after use.	**04 M**