

Name :

Roll No. :

Invigilator's Signature :

CS/B.Tech (BME)/SEM-6/BME-601/2010

2010

THERAPEUTIC EQUIPMENT

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : $10 \times 1 = 10$

i) The paddle diameter for external defibrillator varies from

- a) 8-10 cm
- b) 10-15 cm
- c) 15-18 cm
- d) none of these.

ii) The most suitable power source for a pacemaker is

- a) Nuclear battery
- b) Mercury battery
- c) Lithium battery
- d) none of these.

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- iii) Phototherapy unit is used mainly for
 - a) Premature baby heating
 - b) Cerebral disorders
 - c) Jaundice
 - d) none of these.

- iv) In defibrillation
 - a) Repolarization occurs
 - b) Depolarization occurs
 - c) Hyperpolarization occurs
 - d) none of these.

- v) The full form of TENS is
 - a) Terminal Electrode for Normal Skin
 - b) The Electro Natural Source
 - c) Transcutaneous Electrical Nerve Stimulation
 - d) none of these.

- vi) In a capacitive type of defibrillator the Lown pulse can be converted to Mono pulse by eliminating the
 - a) Capacitor
 - b) Inductor
 - c) Resistor
 - d) none of these.



vii) Which IC is required to design the pacemaker circuit ?

- a) 555
- b) BC-547
- c) LM-335
- d) L-200.

viii) Fibrillation of human heart is

- a) single type
- b) two types
- c) three types
- d) four types.

ix) For surgical diathermy the Blended Wave is used for

- a) cutting
- b) coagulation
- c) both cutting and coagulation
- d) no sensation.

x) The Chronaxie value is

- a) twice of rheobase
- b) thrice of rheobase
- c) same as rheobase
- d) none of these.

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GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following.

3 × 5 = 15

2. What are the different safety measures to be taken during electrosurgery ?
3. Describe the operating principle of surgical diathermy.
4. What are the different components of an anaesthesia delivery system ? Explain in brief.
5. Briefly discuss about the nomenclature of artificial pace- maker.
6. How is the induced voltage to the cardiac tissue related with the radius of the spherical pacing electrode ? Discuss with mathematical deduction.
7. With block diagram discuss the functions of baby incubator.

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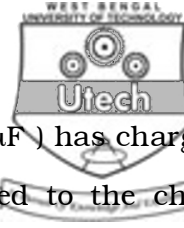


GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

8. Briefly explain the operating principle and application of laser in surgery. Write down the basic principle of extracorporeal shock wave lithotripter. 9 + 6
9. Explain the operating principle of an implantable pacemaker. What are the power sources used in implantable pacemaker ? What are the problems encountered in implantable pacemaker ? 8 + 4 + 3
10. Describe the operating principle of an electrosurgery machine. List three mechanisms by which accidental burning of a patient can occur. Calculate the power dissipated in 0.4 m^2 of tissue that has a resistivity of $1.5 \times 10^3 \Omega\text{-m}$ if the current density is 0.26 A/m^2 . 6 + 5 + 4



11. a) In a defibrillator the capacitor ($C = 100\mu\text{F}$) has charged up to V (800 volt), then it discharged to the chest surface having load resistance R (100Ω); after 10 ms a shunt SCR short-circuits the capacitor and terminates the pulse shown in Fig:

The output voltage delivered to the heart is a function of time t and follows the relation $v(t) = Ve^{-t/RC}$. Find out the total energy supplied to the heart by the defibrillator. Also find out the loss of energy of the capacitor. 6

- b) Write the process for analysis of a pacing circuit with its algorithm. 6
- c) Draw the circuit diagram of peripheral nerve stimulator. 3



12. a) With block diagram discuss about the microprocessor based ventilator. 5
- b) What are the strategies to improve oxygenation other than increasing FiO_2 ? 5
- c) What do you mean by defibrillator system analyzer ? Discuss it. 5
13. Write short notes on any *three* of the following : 3 × 5
- a) Cardioverter.
- b) Ultrasonic Lithotripter.
- c) Arrhythmia therapy using defibrillator.
- d) Application of Nd-YAG laser & CO_2 laser.
- e) Different electrodes for defibrillator.

