
Question Paper Code: U6B01

B.E./B.Tech. DEGREE EXAMINATION, APRIL 2024

Sixth Semester

Biomedical Engineering

21UBM601 DIAGNOSTIC AND THERAPEUTIC EQUIPMENT

(Regulations 2021)

Duration: Three hours | Maximum: 100 Marks

Answer All Questions

PART A - (10 x 2 = 20 Marks)

1.	List four abnormalities associated with the ECG.	CO1-U
2.	Mention the specification with the ranges of the defibrillators.	CO1-U
3.	List out the applications of MEG in medical field.	CO1-U
4.	Sketch the brain waves obtained during the EEG measurement.	CO1-U
5.	Describe the basic principle behind EMG biofeedback.	CO1-U
6.	Differentiate between surface and intramuscular muscle stimulators.	CO1-U
7.	List the various methods used for respiratory measurement.	CO1-U
8.	What is the function of Humidifiers?	CO1-U
9.	Discuss about polygraph and its application.	CO1-U
10.	What is the purpose of Speech audiometer?	CO1-U

PART – B (5 x 16= 80 Marks)

11.	(a)	(i)	Discuss the working function of various types of pacemaker mode with a neat diagram, stating the importance of each mode of the pacemaker.	CO1-U	(12)
		(ii)	Discuss the working principle of heart rate monitor.	CO1-U	(4)

Or

	(b)	(i) Outline the key aspects of ECG machine maintenance. Discuss the importance of regular calibration, electrode checks, and electrical safety measures.	CO1-U	(12)
		(ii) Compare and contrast AC and DC defibrillators.	CO1-U	(4)
12.	(a)	Discuss how multi-channel EEG recording systems enhance spatial resolution and provide a more comprehensive understanding of brain activity. Evaluate the challenges and advantages associated with implementing multi-channel EEG recordings.	CO1-U	(16)
		Or		
	(b)	Explore the principles and applications of EEG biofeedback instrumentation. Discuss how this technology is used to enhance self-regulation of brain activity.	CO1-U	(16)
13.	(a)	(i) Explain the characteristics of EMG waveform and its recording setup with a neat block diagram.	CO1-U	(8)
		(ii) Analyze the types of nerve and muscle stimulators and EMG biofeedback instrumentation with its clinical application as an example.	CO3-Ana	(8)
		Or		
	(b)	(i) Discuss about accelerometer and its types used to analyze the gait.	CO1-U	(8)
		(ii) Analyze the pressure distribution on the bottom of the foot through all stages of the gait cycle by the instrument used for gait analysis with a neat diagram.	CO3-Ana	(8)
14.	(a)	(i) Describe how total lung volume is measured using whole body plethysmography.	CO1-U	(8)
		(ii) If a patient has low lung compliance, which type of ventilator mode 'pressure-controlled' or 'volume-controlled' might be more appropriate, and why?	CO2-App	(8)
		Or		

	(b)	(i) Briefly discuss the working of patient cycled ventilator.	CO1-U	(8)
		(ii) An athlete takes 20 breaths per minute at room temperature. The air inhaled in each breath is 164.2 ml which contains 20% of oxygen by volume, while is exhaled air contains 10% oxygen by volume. Assuming that all the oxygen consumed is used by converting glucose into carbon dioxide and water. How much heat is produced in (kJ) in the body in one hour? Body temperature is 310 K and enthalpy of combustion of glucose is 3100 kJ / mol at 310 K.	CO2-App	(8)
15.	(a)	(i) Explain with the block diagram, the instrument used to measures kin responses.	CO1-U	(8)
		(ii) Distinguish between pure tone audiometer and speech audiometer.	CO1-U	(8)
		Or		
	(b)	(i) Explain the operating principle of Auto-refractometer with a necessary diagram.	CO1-U	(8)
		(ii) What is Tonometer? Describe in detail about the method to measure the pressure inside eyes.	CO1-U	(8)