
Question Paper Code: U6B01

B.E./B.Tech. DEGREE EXAMINATION, NOV 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.	Outline the key steps involved in the routine maintenance of an ECG machine.	CO1-U	
2.	Mention the specification with the ranges of the defibrillators.	CO1-U	
3.	State different sleep disorders that can happen to a human being for which a doctor would suggest polysomnography.	CO1-U	
4.	Sketch the brain waves obtained during the EEG measurement.	CO1-U	
5.	Briefly explain how ultrasonic therapy units are used in rehabilitation.	CO1-U	
6.	Differentiate between surface and intramuscular muscle stimulators.	CO1-U	
7.	Sketch the block diagram of single channel telemetry.	CO1-U	
8.	What is the function of Humidifiers?	CO1-U	
9.	Define cryogenic technique.	CO1-U	
10.	What is the purpose of Speech audiometer?	CO1-U	

PART – B (5 x 16= 80 Marks)

11.	(a)	Analyze the components of a standard 12-lead ECG. Include discussions on the significance of each wave (P, QRS, T), intervals (PR, QT), and segments,	CO1-U	(16)
		Or		
	(b)	Discuss the principles on plethysmography along with the methods, and clinical applications. Discuss how plethysmography measures changes in blood volume.	CO1-U	(16)

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)	Assess the importance of nerve conduction velocity (NCV) measurements in the diagnosis of peripheral neuropathies. Compare and contrast the techniques used for motor and sensory nerve conduction studies, emphasizing their clinical significance.	CO2-App	(16)
		Or		
	(b)	Describe the advancements in surgical instruments and technologies, focusing on how innovations contribute to improved surgical outcomes. Compare traditional surgical instruments with modern robotic-assisted surgical systems.	CO2-App	(16)
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) Compare and contrast endoscopy and laparoscopy as minimally invasive medical procedures. Discuss the basic principles, instruments, and technologies involved in each technique. CO1-U (16)

Or

(b) Explain the fundamental principles of endoscopy in diagnostic medicine. Discuss how endoscopic procedures have revolutionized the field of gastroenterology, highlighting specific gastrointestinal conditions diagnosed through endoscopy. CO1-U (16)