Reg. No. : | | | | | | | | | | | | |

Question Paper Code: UB704

B.E./B.Tech. DEGREE EXAMINATION, APRIL / MAY 2025

Professional Elective

Biomedical Engineering

21BMV704- THERAPEUTIC EQUIPMENT

(Regulations 2021)

Duration: Three hours | Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1.	Why do ablation catheters have varying lengths?	CO1- U
2.	Describe two key differences between internal and external pacemakers in terms of function and placement.	CO1-U
3.	What is the primary function of a peripheral nerve stimulator?	CO1- U
4.	In which medical conditions would cervical or lumbar traction be recommended?	CO1- U
5.	How does ultrasound therapy provide deep heat to tissues?	CO1- U
6.	What is the role of high-frequency vibrations in ultrasonic spot removers?	CO1- U
7.	Why is a dental vacuum pump essential in procedures like tooth extraction?	CO1- U
8.	List two dental conditions that can be detected using radiographs	CO1- U
9.	Assess the advantages and limitations of using microwave diathermy for deep tissue therapy.	CO1- U
10.	Compare the heat penetration of near-infrared and far-infrared lamps in tissue therapy.	CO1- U

PART – B (5 x 16= 80 Marks)

11.	(a)	(i) How does the mechanism of action of an Automated External Defibrillator (AED) differ from that of a Manual Defibrillator?	CO1- U	(8)
		(ii) Design an advanced defibrillator analyzer with enhanced real-time monitoring and diagnostic capabilities	CO3- App	(8)

Or

	(b)	(i) How do the operational principles of pneumatic and electronic ventilators differ in terms of breath delivery and control mechanisms?	CO1- U	(8)
		(ii) Design a weekly maintenance plan to ensure a humidifier operates efficiently and remains free from mold and bacteria buildup.	CO3- App	(8)
12.	(a)	"Develop a comprehensive rehabilitation program incorporating Functional Electrical Stimulation (FES) for a patient with lower limb weakness due to spinal cord injury. Your answer should include the key components of FES therapy, its physiological benefits, the potential risks involved, and strategies to optimize patient outcomes."	CO4-Ana	(16)
		Or		
	(b)	Critically evaluate the role of Transcutaneous Electrical Nerve Stimulation (TENS) in pain management. Your response should include an analysis of its underlying mechanisms, clinical applications, therapeutic efficacy, potential limitations, and recommendations for optimal use in different patient populations.	CO4-Ana	(16)
13.	(a)	Analyze how radiofrequency (RF) therapy and ultrasound skin tightening treatments differ in terms of mechanisms of action, depth of tissue penetration, and target tissue response	CO3-Ana	(16)
		Or		
	(b)	Critically evaluate the effectiveness of steady-state cardio versus HIIT on a stationary bike for sustainable weight loss. Discuss the advantages, drawbacks, and scientific evidence supporting each method's role in long-term fat management	CO3-Ana	(16)
14.	(a)	Analyze the functional differences between low-speed and high-speed dental handpieces, focusing on their mechanisms, clinical applications, and impact on patient care.	CO3-Ana	(16)
		Or		
	(b)	Examine the interplay between vacuum and pneumatic technologies and personal protective equipment (PPE) in a comprehensive infection control plan for dental clinics.	CO3-Ana	(16)

15. (a) Analyze the working principle and energy source of microwave diathermy. How do these contribute to its clinical effects on various tissues? CO3-Ana (16)

Or

(b) Design a treatment plan using Ruby Laser for a patient with both a pigmented lesion and an unwanted tattoo, explaining the rationale behind wavelength selection, energy dose, and tissue response. CO3-Ana (16)