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

Question Paper Code: UB702

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

Professional Elective

Biomedical Engineering

21BMV702 - HUMAN ASSIST DEVICE

(Common to Biotechnology)

(Regulations 2021)

Duration: Three hours | Maximum: 100 Marks

Answer All Questions

PART A - (10x 2 = 20 Marks)

1.	Differentiate pulsatile and continuous pumps in a heart-lung machine.	CO1-U
2.	Name two types of artificial hearts currently used or in development.	CO1-U
3.	List the functions and need for cardiac assist devices.	CO1-U
4.	Mention the common indications for a cardiac transplant.	CO1-U
5.	State the primary function of an artificial kidney.	CO1-U
6	What is an implantable artificial kidney and how does it differ from traditional dialysis?	CO1-U
7	List the different types of ventilators used in respiratory therapy.	CO1-U
8	Name two types of wearable devices for hearing correction.	CO1-U
9	State the primary function of a Transcutaneous Electrical Nerve Stimulator.	CO1-U
10	List out the advantage of point-of-care testing over traditional laboratory testing.	CO1-U

PART – B (5 x 16= 80 Marks)

11.	(a)	(i) Describe the different types of oxygenators used in extracorporeal circulation and their specific functions.	CO1-U	(8)
		(ii) Discuss about the important considerations in blood handling systems during cardiopulmonary bypass to prevent hemolysis and ensure patient safety.	CO1-U	(8)

Or

	(b)	(i) Describe the functioning and the various types of artificial hearts available for patients with end-stage heart failure.	CO1-U	(8)
		(ii) Explain the medical indications for considering a cardiac transplant and the process involved in selecting candidates for surgery.	CO1-U	(8)
12.	(a)	(i) Describe the functioning of right and left ventricular bypass pumps. How do they assist in maintaining cardiac output in patients with heart failure?	CO1-U	(8)
		(ii) In a patient with end-stage heart failure, how would you apply an auxiliary ventricle device to support cardiac function? What are the key clinical considerations when using this device, and how would you monitor the patient post-implantation?	CO2-App	(8)
		Or		
	(b)	(i) Describe the principle of external counter pulsation techniques. How do they improve coronary perfusion and reduce the heart's workload?	CO1-U	(8)
		(ii) In a patient with aortic valve stenosis, how would you apply the decision-making process to select between a mechanical or biological prosthetic valve? What clinical factors would influence your choice?	CO2-App	(8)
13.	(a)	(i) Differentiate between the various types of hemodialyzers used in clinical practice.	CO1-U	(8)
		(ii) Given a patient's specific needs (e.g., uremic toxins, fluid overload), how would you select the appropriate type of hemodialyzer? Explain the process of choosing between high-flux and low-flux hemodialyzers based on clinical indicators.	CO3-App	(8)
		Or		
	(b)	(i) Explain the concept of a wearable artificial kidney. How does it differ from traditional hemodialysis methods.	CO1-U	(8)
		(ii) In what ways would you apply the wearable artificial kidney technology to improve the quality of life for patients with chronic kidney disease? Explain the potential benefits and the factors that need to be considered when implementing this device for long-term use.	CO3-App	(8)

14.	(a)	(i) Explain the functioning and clinical application of an intermittent positive pressure ventilator (IPPV). How does it differ from other types of ventilators in terms of usage and patient benefits?	CO1-U	(10)
		(ii) How does an electronic IPPB unit monitor respiratory parameters, and why is continuous monitoring essential for patient safety and treatment optimization?	CO1-U	(6)
		Or		
	(b)	Explain the basic principles and components of hearing aids.Also discuss the various types of hearing aids available for hearing loss. How does each type address different forms and severities of hearing impairment?	CO1-U	(16)
15.	(a)	Analyze the factors that influence the effectiveness of both TENS and biofeedback therapies in clinical practice. How do patient-specific variables (e.g., age, medical history, condition severity) and device settings affect treatment outcomes?	CO4-Ana	(16)
		Or		
	(b)	Analyze the effectiveness of biofeedback in the management of psychological and physiological disorders. What are the limitations of biofeedback therapy, and how do these limitations impact its overall success rate in patient care?	CO4-Ana	(16)