Roll No. | | | | | | | | | | |

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. / B. Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, APRIL / MAY 2024

BIOMEDICAL ENGINEERING
VI Semester
BM5601 & DIAGNOSTIC AND THERAPEUTIC EQUIPMENT - II
(Regulations 2019)

Time: 3hrs Max.Marks: 100

CO 1	Explain about measurements of parameters related to respiratory system.
CO 2	Appreciate the use of advanced laser technology in diagnosis and minimally invasive therapies.
CO 3	Analyze different types of diathermy units.
CO 4	Understand the concepts of ultrasound equipment.
CO 5	Identify the electrical hazards and Implement methods of patient safety.

BL – Bloom's Taxonomy Levels
(L1 - Remembering, L2 - Understanding, L3 - Applying, L4 - Analysing, L5 - Evaluating, L6 - Creating)

PART- A (10 x 2 = 20 Marks)
(Answer all Questions)

Q. No	Questions	Marks	CO	BL
1	State the principle of the apnea monitor.	2	1	L2
2	Define airway resistance. Mention any two methods to measure it.	2	1	L1
3	List the types of lasers with an example for each.	2	2	L1
4	Define any two laser techniques used in neurosurgical-related applications.	2	2	L2
5	Give the practical importance of using patient plate electrode in surgical diathermy.	2	3	L3
6	Define the two methods of application of shortwave therapy.	2	3	L1
7	Give the importance of pulse repetition frequency in ultrasound imaging.	2	4	L3
8	The physician wishes to scan the abdomen using USG. Which frequency range is beneficial? Justify your answer.	2	4	L3
9	What is the purpose of using a GFI unit?	2	5	L3
10	What are the approaches to be followed to protect patients from electric shock in the hospital setting?	2	5	L3

PART- B (5 x 13 = 65 Marks)

Q. No	Questions	Marks	CO	BL
11 (a) (i)	Explain the principle and working of the water-sealed model spirometer with a neat illustration.	8	1	L2
(ii)	Draw a labelled spirogram and brief the significant parameters used in the diagnosis of lung function.	5	1	L2
	OR			
11 (b) (i)	What are ventilators? Describe any one type of assist control ventilation with a neat diagram	8	1	L2
(ii)	Differentiate assist control ventilation without and with pressure support methods.	5	1	L2
12 (a) (i)	Demonstrate the principle and working of flow cytometry. Brief any one application.	13	2	L2

	OR			
12 (b) (i)	Explain in detail the principle, working, and construction of an endoscope.	**8**	2	L2
(ii)	Demonstrate the application of LASER in the treatment of any one retinal disorder.	**5**	2	L2
13 (a) (i)	Describe the working and construction of microwave diathermy with a neat illustration. Enlist its applications.	**13**	3	L3
	OR			
13 (b) (i)	Explain the principle and operating modes of a procedure where there is heat buildup within the tissue generated by high-frequency alternating current for surgical operations.	**8**	3	L3
(ii)	Brief any two of its effects on tissues with neat diagrams.	**5**	3	L3
14 (a) (i)	Describe pulsed wave Doppler imaging.	**7**	4	L3
(ii)	Define and illustrate the A and B modes of ultrasound for imaging the differences in the area that is normal and an area having a cyst in the kidney.	**6**	4	L3
	OR			
14 (b) (i)	Describe the types of echocardiography techniques.	**7**	4	L3
(ii)	Brief an application of ultrasound in the field of gynaecology.	**6**	4	L3
15 (a) (i)	Describe in detail the major types of electric shocks impacting patients due to improper grounding. Discuss their hazards.	**13**	5	L2
	OR			
15 (b) (i)	Explain in detail the various physiological effects of electric current greater than 15mA. Also, discuss the important susceptibility parameters to ensure patient safety.	**13**	5	L2

PART- C (1 x 15 = 15 Marks)

(Q.No.16 is compulsory)

Q. No	Questions	Marks	CO	BL
16. (i)	Describe the laser hazard classification of high-power HeNe lasers used in ophthalmology that cause eye injury rather than treating the condition.	**6**	5	L5
(ii)	A class 3a laser pointer producing a 2 mW beam is being used by a researcher for study purposes. The beam enters the eye and is focused by the cornea and lens to a spot on the retina 16 μm in diameter. Find the irradiance on the retina, assuming that all of the 2 mW of power is focused on the retina leading to its damage.	**6**	5	L5
(iii)	Mention any two precautions that would have averted this situation.	**3**	5	L4