

Reg.No.:



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]

Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 120001

B.E. / B.Tech. END-SEMESTER EXAMINATIONS – NOV. / DEC. 2024

Seventh Semester

Biomedical Engineering

U19BM716 – DIAGNOSTIC AND THERAPEUTIC EQUIPMENT – II

(Regulation 2019)

Time: Three Hours

Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels	K1 – Remembering	K3 – Applying	K5 - Evaluating
(KL)	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Identify the vital parameters that could be measured using patient monitoring systems. Comment about its role in enhancing the patient safety?	2	K1	CO1
2.	How does an infusion pump assist in managing patient fluid balance?	2	K2	CO1
3.	How is the IR and UV lamps utilized in the healthcare applications?	2	K2	CO2
4.	What are the major effects of shortwave diathermy on body tissues?	2	K2	CO2
5.	Suggest the safety considerations should be taken into account when using ultrasound equipment?	2	K1	CO3
6.	Identify the frequency used in ultrasound examinations. What is its significance?	2	K2	CO3
7.	Differentiate cardiopulmonary bypass (CPB) and extracorporeal membrane oxygenation (ECMO).	2	K2	CO4
8.	What is endoscopy? Indicate its difference with the laparoscopy.	2	K1	CO4
9.	List the common sources of electric shock in healthcare environment.	2	K1	CO5
10.	Define: Micro shock and Macro shock.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	Elucidate the functions and importance of monitoring equipment in the ICU/CCU, such as ECG monitors, pulse oximeters, and invasive blood pressure monitors with its basic block diagrams.	13	K3	CO1
	(OR)			
b)	Describe the different types of a telemetry system used in a hospital. Include details on how data is collected, transmitted, and monitored in real time.	13	K4	CO1
12. a)	Explain the principles of ultrasonic diathermy and its therapeutic effects on soft tissues. Also justify how does the ultrasound frequency impact treatment outcomes?	13	K3	CO2
	(OR)			
b) i.	Explain the principles of electrosurgery unit in generating and applying the electrical energy to tissue.	7	K4	CO2
ii.	Analyze the role of different electrosurgical electrodes and their specific uses in surgical procedures.	6		
13. a)	Elaborate the principles of ultrasound imaging with neat diagram and how sound waves are generated, transmitted, and received to create images of internal structures?	13	K4	CO3
	(OR)			
b)	Evaluate the use of ultrasound in obstetrics. How is it employed for prenatal assessment, and what information does it provide regarding fetal development and maternal health?	13	K4	CO3
14. a)	Explain the various components of a heart-lung machine, including the pump, oxygenator, heat exchanger, and filters and examine the contribution of each component to the overall function of the machine.	13	K4	CO4
	(OR)			
b) i.	Explain the lithotripsy procedure for treating kidney stones.	7	K3	CO4
ii.	Describe different types of lithotripsy (e.g., ESWL, ureteroscopy) and their indications and advantages.	6		
15. a)	Illustrate the physiological effects of electric shock on the human body and also express the influence of severity of the shock due to factors like voltage, current, and duration of exposure.	13	K3	CO5

(OR)

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| b) Analyze the responsibilities of hospital administration in ensuring electrical safety. What are the electrical safety standards and codes implemented to address this issue? | 13 | K4 | CO5 |
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PART – C

Q.No.	Questions	(1 x 15 = 15 Marks)		
		Marks	KL	CO
16. a)	A 72-year-old patient with a history of heart failure is admitted to the ICU after undergoing major abdominal surgery. The patient is connected to multiple monitoring devices, including a cardiac monitor, pulse oximeter, and invasive blood pressure monitor. The monitoring system is integrated with alarms for vital sign changes. During the night shift, the ICU nurse notices that the cardiac monitor shows irregular heart rhythms. However, due to alarm fatigue, the nurse dismisses the alarm, believing it to be a false positive. As a result, the patient's deteriorating condition goes unaddressed, leading to a critical event requiring urgent intervention. Questions:	13	K5	CO5

- i) Identify the key factors that contributed to the failure in responding to the cardiac monitor alarms.
- ii) What specific measures could have been taken to enhance the effectiveness of alarm systems?
- iii) Discuss the immediate actions that should be taken by the healthcare team upon recognizing that a patient is experiencing abnormal vital signs. What protocols should be followed to ensure patient safety?
- iv) How can hospitals implement effective training programs to address this issue?
- v) What strategies that can be adopted to ensure that monitoring systems are functioning optimally?

(OR)

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| b) Elaborate the principles of thermography and its applications in medical diagnostics and explain how thermal imaging can be used to detect conditions such as inflammation or cancer. Indicate the effectiveness of treatment with changes in thermal patterns. | 13 | K4 | CO4 |
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