

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. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2025

Seventh Semester

Biomedical Engineering

U19BM716 – DIAGNOSTIC AND THERAPEUTIC EQUIPMENT-II

(Regulation 2019)

Time: Three Hours

Maximum: 100 Marks

Answer ALL the questions

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

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	State any 4 advantages of installing a central monitoring console in a hospital.	2	K2	CO1
2.	Under which circumstances would a wired setup or a wireless setup be needed for transmitting EEG signals?	2	K2	CO1
3.	Give the optical characteristics of IR light. How does it become a therapeutic tool?	2	K2	CO2
4.	Identify the hazards that may occur during electro surgical and electro therapeutic treatments. Suggest measures to safeguard the patients.	2	K2	CO2
5.	Name the 3 modes used in ultrasound scan machines. Give their applications.	2	K2	CO3
6.	What are the effects of ultrasound waves on body tissues?	2	K1	CO3
7.	Mention the principles of thermography imaging. How can they be used for screening applications?	2	K2	CO4
8.	Give the role of cryogenics in surgery and biological preservation.	2	K1	CO4
9.	State the purpose of integrating risk management into IEC 60601-1:2005.	2	K1	CO5
10.	List any two methods used to isolate power circuitry in medical equipment.	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	In a diagnostic centre, cardiovascular diagnosis is done using an ECG recorder. Under certain circumstances, the centre has to relay the ECG signals to a specialist situated within a short radius of few kilometers. Identify the suitable transmission technique. Describe the method, its merits and limitations. Quote examples and use illustrations wherever necessary.	13	K3	CO1
	(OR)			
b)	Patient monitors are vital to take informed decisions in ICUs and CCUs. Describe the vital components of patient monitors and their functioning. How do the modern patient monitors provide seamless healthcare through integration and connectivity?	13	K3	CO1
12. a)	Compare and contrast various electrodes used in surgical diathermy. With a neat illustration, explain the components of a Electrosurgery machine.	13	K4	CO2
	(OR)			
b)	Identify the properties of high frequency electric current that allows it to be used in pain relief and improving mobility of tissues. Describe the role of short waves, micro waves and ultrasound waves in rehabilitation.	13	K4	CO2
13. a)	Explain the working of an ultrasound machine, focusing on the transducer array, signal processing, and image display. Describe beam formation and steering in convex and phased array probes.	13	K3	CO3
	(OR)			
b)	Outline the organs that are focused during an obstetrics and gynecology scan using ultrasound waves. Which probes are suitable for this scan? Explain their functioning. When would low frequency waves be employed? Give the applications of 3D/4D probes.	13	K3	CO3
14. a)	With the aid of neat diagram, show the vital components of a hemodialysis unit. Explain their functioning. Identify patient-specific and operational challenges. What are the factors influencing cost of a dialysis session?	13	K4	CO4
	(OR)			
b)	Explain why laparoscopy is considered a minimally invasive surgical technique. Analyze the feasibility of using laparoscopy as a total alternative to conventional open surgery. Include examples where it may not be suitable.	13	K4	CO4

15. a) Explain the methods of testing earth/ground bond, insulation resistance, and leakage currents in medical electrical devices. Include typical test setups and measurement parameters. 13 K3 CO5

(OR)

b) Outline the physiological effects of electricity. With a focus on the macro shock and micro shock hazards, discuss the mitigation strategies along with their feasibility in hospitals. Give the methods of sensitizing staff and technical personnel towards these electric hazards. 13 K3 CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.	Questions	Marks	KL	CO
16. a)	Describe the functioning of a Cardiopulmonary bypass machine and the role of various types of oxygenators. <ul style="list-style-type: none"> • How could this machine be designed to handle air embolism and blood clots? • If there is a malfunction, there is a need to switch to an alternate pump. Discuss on the critical requirements during the switching. • Identify the issues that could arise due to tubing connects. 	15	K3	CO5
(OR)				
b)	Describe the functioning of Peristaltic pumps. How are they utilized in drug delivery, fluid infusion, and waste management? Give a detailed account on maintaining pressure and flow rate using various sensors and associated circuitry.	15	K3	CO5