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: 120011

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2025
Seventh Semester
Computer Science and Engineering
U19BMOE9 – ICU AND OPERATION THEATRE EQUIPMENTS
(Common to EEE, ECE, IT & BT)
(Regulation 2019)

Time: Three Hours Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	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.	List the applications of portable suction apparatus.	2	K1	CO1
2.	Differentiate between syringe pump and volumetric infusion pump.	2	K2	CO1
3.	Name two types of membranes used in dialyzers.	2	K1	CO2
4.	What is meant by ultra filtration in hemodialysis?	2	K2	CO2
5.	Distinguish between Arterial Cannulas and Venous cannulas.	2	K2	CO3
6.	Mention a specific clinical scenario or type of surgery where rotating disk oxygenators are used.	2	K1	CO3
7.	Name two main gases supplied by an anesthesia machine.	2	K1	CO4
8.	Differentiate between Active Humidification and Passive Humidification.	2	K2	CO4
9.	Differentiate between macroshock and microshock based on current magnitude and potential impact.	2	K2	CO5
10.	Mention the role of Ground Fault Circuit Interrupter in patient electrical safety.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Compare chemical, radiation, and steam sterilization methods used in healthcare.	13	K3	CO1
		(OR)			
	b)	Analyze the primary functions of an infusion pump and how does it differ from manual IV administration. Describe at least two types of infusion pumps and their typical clinical uses.	13	K3	CO1
12.	a)	Describe the structure and function of the dialyzer membrane. Explain how the dialyzer membrane facilitates the removal of waste products and excess fluids from the blood. What properties of the membrane determine its selectivity and efficiency in dialysis?	13	K4	CO2
		(OR)			
	b)	Compare hollow fiber and parallel plate dialyzers in terms of design and efficiency.	13	K4	CO2
13.	a)	Compare and contrast the underlying principles, advantages, and limitations of various oxygenators.	13	K3	CO3
		(OR)			
	b)	If a surgeon needs to maintain a continuous, smooth blood flow during cardiac surgery, which pump suits best and why?	13	K3	CO3
14.	a)	Apply illumination design principles to operation theatre lighting systems. Explain how light intensity, color temperature, and shadow management are optimized for various surgical procedures.	13	K2	CO4
		(OR)			
	b)	Describe the function of the alarm system in an anesthesia machine and categorize the types of alarms it employs.	13	K2	CO4
15.	a)	A new medical device is being introduced into a hospital. Outline the key steps in ensuring its compliance with electrical safety standards and minimizing leakage current risks before it is used on patients.	13	K3	CO5
		(OR)			
	b)	You are a biomedical engineer investigating an electrical incident where a patient experienced a minor shock. Develop a systematic approach to determine the root cause, considering potential sources of leakage current and grounding issues.	13	K4	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	A 58 year old male patient with severe coronary artery disease is scheduled for coronary artery bypass grafting (CABG). During the procedure, the surgical team uses a heart-lung machine (cardiopulmonary bypass) to maintain circulation and oxygenation while the heart is stopped. i. Draw the block diagram of heart-lung machine and explain the function of each block. ii. Explain the primary functions of the heart- lung machine during cardiac surgery. iii. Why is the oxygenator a critical part of the heart-lung machine, how does it mimic the function of the lungs? iv. What is the purpose of the heat exchanger in the circuit during cardiac surgery?	15	K3	CO3
		(OR)			
	b)	What is the need of using an 'Isolation Amplifier'? Explain how opto couplers and pulse transformers provide protection against leakage currents. Explain its working with necessary circuit diagram.	15	K4	CO5