

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086
(For the candidates admitted from the academic year 2023-2024 & thereafter)

M.Sc. DEGREE EXAMINATION, APRIL 2026
BRANCH III - PHYSICS
SECOND SEMESTER

COURSE : ELECTIVE
PAPER : MEDICAL PHYSICS AND ULTRASONICS
COURSE CODE : 23PH/PE/MU15
TIME : 3 HOURS **MAX. MARKS: 100**

Q. No.	SECTION A ANSWER ALL QUESTIONS (10 x 3 = 30)	CO	KL
1	What is systolic pressure? How does it differ from diastolic pressure?	1	1
2	State the principle of Magnetic Resonance Imaging (MRI).	1	1
3	What is a pacemaker? State its function.	1	1
4	Mention the purpose of an anaesthesia machine.	1	1
5	What is light scattering spectroscopy?	2	2
6	How are LASERS used in cancer detection?	2	2
7	State the principle of the continuous wave method.	2	2
8	Define acoustic impedance.	2	2
9	What is an ultrasonic level meter?	3	3
10	Mention any two industrial uses of ultrasonic welding.	3	3
Q. No.	SECTION B	CO	KL
	Part A ANSWER ANY TWO QUESTIONS (2 x 5 = 10)		
11	Explain the measurement of blood pressure using the sphygmomanometer.	3	3
12	Differentiate between haemodialysis and peritoneal dialysis.	3	3
13	Explain the working principle of an ultrasonic interferometer.	3	3
	Part B ANSWER ANY SIX QUESTIONS (6 x 5 = 30)		
14	Describe Electromyography (EMG) signal characteristics and their significance.	4	4
15	Write a note on microprocessor-based ventilators.	4	4
16	Give an account of LASER angioplasty and its clinical significance.	4	4
17	Obtain VanderWaal's constant using Collision factor theory.	4	4

18	Describe the principle and working of ultrasonic flow meters.	4	4
19	Compare reflectance spectroscopy and fluorescence spectroscopy.	4	4
20	Explain Nomoto's relation for binary liquid mixtures.	4	4
21	Describe ultrasonic thickness measurement techniques.	4	4
Q. No.	SECTION C ANSWER ANY TWO QUESTIONS (2 x 15 = 30)	CO	KL
22	Describe electrocardiography (ECG) in detail with block diagram, working principle and ECG waveforms.	5	5
23	Explain the principle and operation of defibrillators. Compare AC and DC defibrillators, highlighting their advantages and limitations.	5	5
24	Discuss the laser-based blood cell counter, outlining its principle and working with its advantages.	5	5
25	Elucidate the experimental arrangement of transmission acoustic holography. Explain its principle and working with a neat diagram.	5	5
