MALLA REDDY UNIVERSITY

SCHOOL OF ALLIED AND HEALTHCARE SCIENCES

M.SC I yr. II Sem RIT

Subject: ADVANCED TECHNIQUE & INSTRUMENTATION OF ULTRASONOGRAPHY

Subject Code: MR25–2RIT202

Duration: 2 hours **Max. Marks:40M**

Question Bank

Qno	Questions	Marks	Section	Unit
1	a. Define ultrasound and its principle (3M). b. Explain its basic physical properties. (5M)	**8**	**Section-I**	**1**
2	Explain the interaction of ultrasound with matter.	**8**	**Section-I**	**1**
3	What is acoustic impedance? Discuss its clinical significance.	**8**	**Section-I**	**1**
4	Explain reflection, refraction, absorption, and scattering of ultrasound waves.	**8**	**Section-I**	**1**
5	Discuss the importance of the angle of incidence in ultrasound imaging.	**8**	**Section-I**	**1**
6	Describe the construction and working principle of an ultrasound transducer.	**8**	**Section-I**	**1**
7	Explain the piezoelectric effect and its role in ultrasonography.	**8**	**Section-I**	**1**
8	Classify different types of ultrasound transducers with applications.	**8**	**Section-I**	**1**
9	Write a short note on modern advances in ultrasound transducer design.	**8**	**Section-I**	**1**
10	a. Explain bandwidth, damping, and matching layers in transducers. (5M) b. Explain the properties of ultrasound. (3M)	**8**	**Section-I**	**1**
11	Explain different ultrasound image display modes (A, B, M modes).	**8**	**Section-II**	**2**
12	Describe real-time ultrasound imaging.	**8**	**Section-II**	**2**
13	Explain the principle of pulse echo ultrasound.	**8**	**Section-II**	**2**

14	Describe the block diagram of pulse-echo ultrasound instrumentation.	**8**	**Section-II**	**2**
15	Explain the role of the beam former in ultrasound imaging.	**8**	**Section-II**	**2**
16	Write a note on the pulse transmitter and receiver in ultrasound systems.	**8**	**Section-II**	**2**
17	Explain various ultrasound machine controls and their functions.	**8**	**Section-II**	**2**
18	Describe image storage systems used in ultrasonography.	**8**	**Section-II**	**2**
19	Explain pre-processing and post-processing techniques in ultrasound imaging.	**8**	**Section-II**	**2**
20	Write a short note on scan converter memory and computer storage.	**8**	**Section-II**	**2**
21	Explain the Doppler effect in ultrasonography.	**8**	**Section-III**	**3**
22	a. Define Doppler. (3M) b. Define Doppler shift frequency and derive the Doppler equation. (5M)	**8**	**Section-III**	**3**
23	Explain the significance of the Doppler angle in blood flow measurement.	**8**	**Section-III**	**3**
24	Compare continuous wave Doppler and pulsed Doppler.	**8**	**Section-III**	**3**
25	What is duplex scanning? Explain its clinical applications.	**8**	**Section-III**	**3**
26	Describe Doppler spectral analysis and display.	**8**	**Section-III**	**3**
27	Explain colour flow imaging and its principles.	**8**	**Section-III**	**3**
28	Write a short note on power Doppler imaging.	**8**	**Section-III**	**3**
29	Explain Doppler instrumentation and system components.	**8**	**Section-III**	**3**
30	Discuss image quality factors and common ultrasound artefacts.	**8**	**Section-III**	**3**
31	What are ultrasound contrast agents? Explain their types.	**8**	**Section-IV**	**4**
32	Discuss the uses and clinical indications of ultrasound contrast agents.	**8**	**Section-IV**	**4**
33	Explain harmonic imaging and its advantages.	**8**	**Section-IV**	**4**
34	Describe contrast harmonic imaging and its clinical applications.	**8**	**Section-IV**	**4**
35	What is real-time compounding? Explain its benefits.	**8**	**Section-IV**	**4**
36	Explain extended field of view imaging in ultrasound.	**8**	**Section-IV**	**4**
37	Write a note on the ultrasound protocol for abdominal examination.	**8**	**Section-IV**	**4**
38	Describe the ultrasound protocol for neck imaging.	**8**	**Section-IV**	**4**

39	Explain the obstetric ultrasound protocol.	**8**	**Section-IV**	**4**
40	Discuss the necessity and advantages of contrast-enhanced ultrasound.	**8**	**Section-IV**	**4**
41	Explain the principles of 3D ultrasound imaging.	**8**	**Section-V**	**5**
42	Describe 4D ultrasound imaging and its clinical applications.	**8**	**Section-V**	**5**
43	Explain acquisition, visualization, and display methods in 3D/4D ultrasound.	**8**	**Section-V**	**5**
44	Write a short note on elastography and its clinical importance.	**8**	**Section-V**	**5**
45	Explain high-intensity focused ultrasound (HIFU).	**8**	**Section-V**	**5**
46	Discuss intraoperative ultrasound applications.	**8**	**Section-V**	**5**
47	Explain ophthalmic ultrasound and its uses.	**8**	**Section-V**	**5**
48	Describe the biological effects of ultrasound on tissues.	**8**	**Section-V**	**5**
49	a. Explain ultrasound safety considerations b. Define thermal & mechanical indices.	**8**	**Section-V**	**5**
50	Write a note on ultrasound equipment quality assurance and performance measurements.	**8**	**Section-V**	**5**