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فيزياء وأجهزة الموجات - المستوى الثالث -قسم اشعة - - كلية الطب والعلوم الصحية-برامج علوم تطبيقية - الفترة - درجة الامتحان (70)

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1) Ultrasound is defined as sound waves with frequencies above :
   1) - 1kHz
   2) - 20Hz
   3) - 20MHz
   4) + 20kHz
2) What type of crystals are commonly used in ultrasound transducers?
   1) - Acoustic
   2) + piezoelectric
   3) - Magnetiic
   4) - Semiconducting
3) What determines the depth of ultrasound penetration?
   1) + Frequency
   2) - Amplitude
   3) - Velocity
   4) - Transducer size
4) Which of the following describes axial resolution in ultrasound imaging?
   1) - The ability to distinguish two structures that are side by side
   2) + The ability to distinguish two structures that are close together along the path of the beam
   3) - The ability to measure the depth of a structure
   4) - The ability to measure the speed of sound in tissue
5) Axial reolution improves when :
   1) - Pulse length increases
   2) - wave length increases
   3) - Frequency decreases
   4) + Frequency increases
6) What is the term for the ability of a material to conduct sound waves?
   1) - Attenuation
   2) - Impedance
   3) + Acoustic propagation
   4) - Compression
7) Which material has the lowest acoustic impedance ?
   1) - Bone
   2) + Air
   3) - Muscle
   4) - Fat
8) Reflection of ultrasound waves occurs at interfaces due to difference in :
   1) - Pulse length
   2) - Electrical conductivity
   3) - frequency
   4) + Acoustic impedance
9) What is the primary function of pulse generator in ultrasound machine?
   1) + To generate electrical pulses to drive the transducer
   2) - To convert sound waves into electrical signals
   3) - To process and display the ultrasound image
   4) - To amplify the returning echoes

10) Which type of transducer provides a wide field of view?
- 1) - Linear
- 2) - Phased array
- 3) - Sector
- 4) + Convex

11) Acoustic imedance is calculated by multiplying :
- 1) + Velocity and density
- 2) - frequency and wavelength
- 3) - speed and thickness
- 4) - wave length and frequency

12) What causes the piezoelectric crystal in an ultrasound transducer to momentarily change shape?
- 1) - Mechanical ressure
- 2) - Magnetic field fluctuations
- 3) - Acoustic propagation
- 4) + high frequency voltage osilltions

13) Why are transducer crystals coated with a thin layer of silver?
- 1) - To increase mechanical strength
- 2) - To conductu sound waves efficently
- 3) + To serve sa an electrode
- 4) - To enhance acoustic absorbtion

14) Which statement is true regarding ultrasound transducers?
- 1) - They only function in continuos wave mode
- 2) + They can function either in pulsed or continuos wave mode
- 3) - They don’t convert pressure into electrical signals
- 4) - They can only transmit ultrasonic waves , not receive them

15) What does Pulse Repetition Frequency represent in ultrasound imaging?
- 1) - The taken for a pulse to travel to the target and back
- 2) + The number of pulses emitted per second
- 3) - The frequency of the ultrasound waves
- 4) - The rate which echoes are received by the transducer

16) Which of the following tissues has the highest velocity of ultrasound ?
- 1) + Bone
- 2) - Liver
- 3) - Air
- 4) - Fat

17) What does a high Q factor tansducer indicate ?
- 1) - Wide bandwidth and heavy damping
- 2) - Narrow bandwidth and heavy damping
- 3) + Narrow bandwidth and very little damping
- 4) - Wide bandwidth and very little damping

18) Increasing stifness (K) in a material will have what effect on the velocity of sound ?
- 1) - Decrease velocity
- 2) - No effect
- 3) - Cause velocity fluctuations
- 4) + Increase velocity

19) How is Q factor related to spatial pulse length?
- 1) - Invesely proportional
- 2) - Not related
- 3) + Directly proportional

4) - Equal to spatial pulse lenth

20) What determines the length of the near field of an ultrasound transducer?
1) + Radius squared doivided by wave length
2) - Frequency only
3) - Diameter of the transducer element only
4) - Angle of divergence

21) What does the depth of view reprezent in ultrasound imaging ?
1) - The total distance travel by the beam
2) - The velocity of the sound wave
3) - The duration of pulse repetition
4) + The maximum depth that can be imaged

22) Which of the following leads to a higher PRF?
1) - Imaging superficial structures
2) + Imaging deeper structures
3) - Fewer lines per frame
4) - Using lower frequency transducer

23) What is the purpose of dampimg layer in an ultrasound transducer?
1) - To increase transducer sensitivity
2) + To reduce signal distortion
3) - To enhance transducer durability
4) - To control beam width

24) If acoustic imedance between two tissues is similar, reflection at the interface is :
1) - Very high
2) - Moderate
3) + Minimal
4) - Independent of imedance

25) Which frequency corresponds to the shortest wavelength based on the provided data?
1) + 15MHz
2) - 10MHz
3) - 2MHz
4) - 5MHz

26) What are the main components of ultrasound attenuation ?
1) - Reflection, refraction, and scattering
2) - Refraction, absorbtion, and echo
3) + Scattering , diffraction, and absorbtion
4) - Scattering , resonance , and refraction

27) What is the thickness of the ideal matching layer in an ultrasound transducer?
1) - Equal to the wavelength
2) - One -half of the wavelength
3) - Twice the wavelength
4) + One- fourth of the wavelength

28) What is the purpose of the matching layer in an ultrasound transducer?
1) - Increase transducer sensitivity
2) - Improve transducer durability
3) + Reduce attenuation
4) - Reduce heat generation

29) What is the term for the ability of an ultrasound transducer to distinguish between structures?
1) - Sensitivity
2) - Attenuation

3) - Refraction
4) + Resolution

30) Which transducer characteristics affect the lateral resolution of an ultrasound?
1) - Pulse repetition frequency
2) + Beam Width
3) - Focal depth
4) - Frame rate

31) Which transducer characteristics affect the axial resolution of an ultrasound?
1) - Beam Width
2) - Beam height
3) + Pulse length
4) - Frame rate

32) Which principle does Doppler ultrasound rely on?
1) - Reflection
2) - Refraction
3) + Doppler effect
4) - Attenuation

33) In ultrasound imaging What does Doppler mode primarily assess?
1) - Tissue density
2) + Blood flow velocity
3) - Elasticity of tissues
4) - Temperature variations

34) What is the function of the time gain compensation (TGC) control on an ultrasound machine?
1) - Adjusts the frequency
2) + Compensate for depth related signal loss
3) - Reduces noise artifact
4) - Alters the pulse duration

35) How does the beam width affect lateral resolution ?
1) + Narrower beam width improves lateral resolution
2) - Wider beam width improves lateral resolution
3) - Beam width has no effect on lateral resolution
4) - Beam width only affects axial resolution