

# MULTIPLE CHOICE

## TRANSDUCERS - PRACTICE SET - ANSWER KEY

PROPOSED FOR REVIEW - questions are the author's verbatim Q&A; distractors are auto-selected from other answers in the same bank and must be checked by a subject-matter reviewer (a distractor could coincidentally be correct). Not authoritative assessment content.

1. What is PZT also commonly called in a transducer?

- A. The acoustic lens
- B. The electrical shield
- C. The backing block
- D. The active element or crystal**

2. What Q-factor is associated with a wide bandwidth probe?

- A. High Q-factor
- B. Zero Q-factor
- C. Q-factor equal to depth
- D. Low Q-factor**

3. What happens to frequency when the speed of sound in PZT is faster?

- A. It is lower
- B. It is higher**
- C. It is unchanged
- D. It becomes equal to wavelength

4. What two active-element characteristics determine the frequency of sound it produces?

- A. Pulse duration and pulse repetition period
- B. Speed of sound in the PZT and PZT thickness**
- C. Matching layer thickness and backing stiffness
- D. Imaging depth and output power

5. What is the frequency of sound emitted by a continuous wave probe equal to?

- A. Frequency of the electrical signal**
- B. Pulse repetition frequency
- C. Speed of sound in tissue
- D. Thickness of the PZT

6. What are materials that convert sound into electricity and electricity into sound called?

- A. Backing materials
- B. Piezoelectric materials**
- C. Acoustic insulators
- D. Matching materials

7. Which transducer component provides the electrical connection between the PZT and the ultrasound system?

- A. Wire**
- B. Backing material
- C. Case
- D. Matching layer

8. What type of material is PZT?

- A. A coupling gel
- B. A display phosphor
- C. Found in nature
- D. Man-made**

9. What range of frequencies does a continuous-wave Doppler probe create?

- A. Narrow range**
- B. Only harmonic frequencies
- C. No frequencies
- D. Wide range

10. How are PZT thickness and frequency related in a pulsed wave transducer?

- A. Equal to each other
- B. Directly related
- C. Unrelated
- D. Inversely related**

11. True or False? Backing material reduces active element vibration during transmission and reception.

- A. True**
- B. False

12. True or False? Imaging probes create a narrow range of frequencies.

- A. True
- B. False**

13. What is the temperature at which PZT is polarized called?

- A. Curie temperature**
- B. Half-value temperature
- C. Room temperature
- D. Thermal index

14. Which pulses degrade axial resolution?

- A. Short pulses
- B. Long pulses**
- C. Damped pulses
- D. Broad-bandwidth pulses

15. Which transducer component prevents case vibrations from inducing voltage in the PZT?

- A. Matching layer
- B. Electrical shield
- C. Acoustic insulator**
- D. Backing material

16. What piezoelectric material is commonly used in clinical ultrasound transducers?

- A. Quartz
- B. Lead zirconate titanate (PZT)**
- C. Tourmaline
- D. Silicone gel

17. What does the frequency of sound created by the active element of a pulsed wave transducer depend on?

- A. Characteristics of the active element within the transducer**
- B. Frequency of the electrical spike
- C. Imaging depth selected by the sonographer
- D. Pulse repetition frequency

18. During which process is a reflected sound pulse converted into electricity?

- A. Refraction
- B. Display storage
- C. Transmission
- D. Reception**

19. What is the reduction or removal of infectious organisms using a chemical agent called?

- A. Disinfection**
- B. Attenuation
- C. Polarization
- D. Sterilization

20. What are typical effects of backing material in a pulsed transducer?

- A. Higher gain, no bandwidth, and no attenuation
- B. Decreased sensitivity, low Q-factor, and wide bandwidth**
- C. Increased sensitivity, high Q-factor, and narrow bandwidth
- D. No damping, high sensitivity, and single frequency

**21. What Q-factor is associated with a shorter pulse?**

- A. No Q-factor
- B. Higher Q-factor
- C. Lower Q-factor**
- D. Q-factor equal to PRF

**22. During which process is electrical energy converted into sound?**

- A. Reception
- B. Transmission**
- C. Reflection
- D. Scan conversion

**23. What creates a short-duration electrical spike that travels through the wire to the active element?**

- A. Backing material
- B. Pulsed wave ultrasound system**
- C. Matching layer
- D. Continuous wave Doppler system

**24. What is located in front of the PZT at the face of the transducer?**

- A. Backing layer
- B. Electrical shield
- C. Acoustic insulator
- D. Matching layer**

**25. What is the active element of the transducer?**

- A. PZT**
- B. Gel
- C. Backing material
- D. Electrical cable