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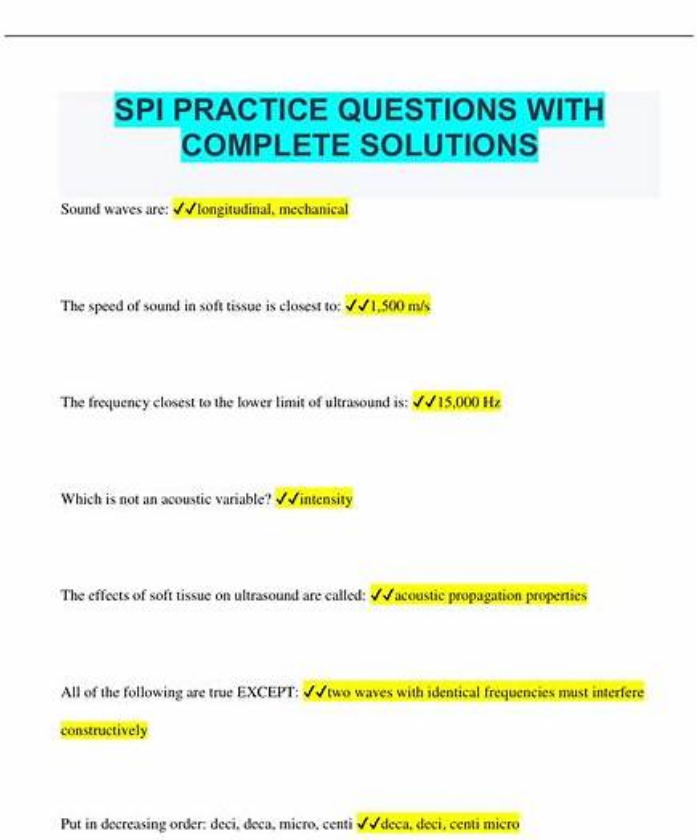

SPI PRACTICE QUESTIONS WITH COMPLETE SOLUTIONS

Sound waves are: ✓✓longitudinal, mechanical

The speed of sound in soft tissue is closest to: ✓✓1,500 m/s

The frequency closest to the lower limit of ultrasound is: ✓✓15,000 Hz

Which is not an acoustic variable? ✓✓intensity

The effects of soft tissue on ultrasound are called: ✓✓acoustic propagation properties

All of the following are true EXCEPT: ✓✓two waves with identical frequencies must interfere constructively

Put in decreasing order: deci, deca, micro, centi ✓✓deca, deci, centi micro

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ARDMS SPI Exam Syllabus Topics:

Topic	Details
Topic 1	• Manage Ultrasound Transducers: This section of the exam measures skills of Ultrasound Technicians and focuses on the management and proper use of different types of transducers. It evaluates knowledge of transducer components, frequency selection, and application of various 2D, 3D, 4D, and nonimaging transducer concepts. Candidates must show they can choose the appropriate transducer for specific examinations and make necessary frequency adjustments to ensure image quality.
Topic 2	• Perform Ultrasound Examinations: This section of the exam measures skills of Sonographers and covers how to conduct ultrasound procedures while ensuring patient safety and diagnostic accuracy. It includes understanding of imaging protocols, ergonomics, patient care, and the interaction between sound and tissue. Candidates are expected to demonstrate abilities to manage patient encounters, apply 3D • 4D and contrast imaging concepts, identify and correct artifacts, and follow confidentiality and privacy standards throughout the scanning process.
Topic 3	• Apply Doppler Concepts: This section of the exam measures skills of Vascular Sonographers and evaluates understanding and application of Doppler ultrasound principles. It includes knowledge of Doppler angle, flow dynamics, and color and spectral Doppler imaging. The section also covers eliminating aliasing, interpreting waveforms, applying continuous and pulsed wave Doppler, and optimizing Doppler gain and scale to accurately measure blood flow and velocity within vessels.
Topic 4	• Provide Clinical Safety and Quality Assurance: This section of the exam measures skills of Clinical Ultrasound Supervisors and focuses on maintaining safety and quality standards in ultrasound practice. It includes infection control protocols, transducer and machine integrity checks, and quality assurance testing using tissue-mimicking phantoms. The section also requires familiarity with statistical parameters like sensitivity and specificity to evaluate diagnostic performance and ensure consistent, reliable imaging outcomes.
Topic 5	• Optimize Sonographic Images: This section of the exam measures skills of Diagnostic Medical Sonographers and assesses their ability to enhance image quality using advanced optimization techniques. It includes understanding axial, lateral, elevational, and temporal resolution, as well as manipulating gain, depth, magnification, and dynamic range. Examinees are expected to apply harmonic imaging, spatial compounding, and gray-scale techniques to produce clear, accurate diagnostic images.

ARDMS Sonography Principles and Instrumentation Sample Questions (Q14-Q19):

NEW QUESTION # 14
What reduces speckle and increases visualization of specular reflectors and attenuated structures?

- A. Spatial compounding
- B. Pixel interpolation
- C. Extended field of view
- D. Elastography

Answer: A

Explanation:
Comprehensive and Detailed Explanation From Exact Extract:
Speckle is a form of acoustic noise caused by interference of scattered echoes. Spatial compounding acquires multiple images from different angles and combines them to reduce speckle, enhance tissue texture, and improve visualization of structures that may otherwise be obscured by attenuation or artifact. The Principles and Instrumentation documentation states:

"Spatial compounding averages frames obtained at varying insonation angles. This reduces speckle artifact, smooths tissue texture, and improves visibility of specular reflectors and deeper structures." Therefore, the correct answer is D: Spatial compounding.
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NEW QUESTION # 15
What does compression affect in the ultrasound image?

- A. The shades of gray displayed
- B. The elevational resolution
- C. The temporal resolution
- D. The number of lines displayed

Answer: A

Explanation:
Comprehensive and Detailed Explanation From Exact Extract:
Compression reduces the dynamic range of the returning echoes, which alters how many shades of gray are displayed. It compresses the range of signal amplitudes to fit into the grayscale display range.
According to sonography instrumentation reference:
"Compression alters the dynamic range, adjusting how many shades of gray are displayed to optimize image contrast." Therefore, the correct answer is B: The shades of gray displayed.
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NEW QUESTION # 16
The calipers in this image measure which performance characteristic of a system?

- A. Depth measurement accuracy
- B. Dynamic range
- C. Axial resolution
- D. Lateral resolution

Answer: A

Explanation:
The calipers shown in the image are used to measure the depth of structures within the ultrasound image. This performance characteristic, known as depth measurement accuracy, assesses how accurately the ultrasound system can measure the distance from the transducer to a specific point within the body. Accurate depth measurements are crucial for diagnostic purposes, ensuring that anatomical and pathological structures are correctly identified and evaluated.
Reference:
American Registry for Diagnostic Medical Sonography (ARDMS) Sonography Principles and Instrumentation study materials.
Textbook of Diagnostic Sonography by Hagen-Ansert, S. L. (latest edition).

NEW QUESTION # 17
Which color Doppler artifact is visualized in this image?

- A. Twinkle
- B. Ghosting
- C. Aliasing
- D. Bleed

Answer: C

Explanation:
The color Doppler image shows an artifact where high-velocity blood flow exceeds the Nyquist limit, resulting in color wrap-around or aliasing. This artifact is visualized as a mosaic pattern of colors that abruptly change, indicating that the velocity exceeds the color Doppler scale's maximum. Aliasing occurs when the sampling rate (pulse repetition frequency) is insufficient to accurately capture the high velocities, causing the display to cycle back to lower velocities.

Reference:
ARDMS Sonography Principles & Instrumentation Guidelines
Hagen-Ansert SL. Textbook of Diagnostic Ultrasonography. 8th ed. St. Louis, MO: Mosby; 2017.

NEW QUESTION # 18
What device is used to determine axial resolution?

- A. Doppler phantom
- B. Hydrophone
- C. Tissue-mimicking phantom
- D. Beam profiler

Answer: C

Explanation:
Comprehensive and Detailed Explanation From Exact Extract:
A tissue-mimicking phantom contains small targets at known separations to evaluate the system's axial resolution, lateral resolution, depth calibration, and more.
Principles and Instrumentation state:
"Tissue-mimicking phantoms assess spatial resolution (axial, lateral), depth accuracy, and penetration performance."
* Hydrophones (B) measure acoustic pressure.
* Beam profilers (C) assess beam characteristics.
* Doppler phantoms (D) test Doppler function.
Therefore, the correct answer is A: Tissue-mimicking phantom.
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NEW QUESTION # 19
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