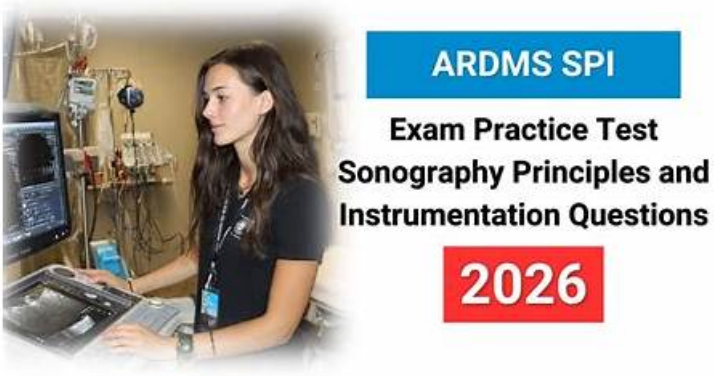
2026 ARDMS SPI: First-grade Sonography Principles and Instrumentation Test Book



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ARDMS SPI Exam Syllabus Topics:

Topic	Details
Topic 1	• 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 2	• 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 3	• 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.
Topic 4	• 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 5	• 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.

ARDMS Sonography Principles and Instrumentation Sample Questions (Q75-Q80):

NEW QUESTION # 75
A Doppler shift is 10,000 Hz at an angle of flow of 60 degrees. What is the Doppler shift at 0 degrees?

- A. 20,000 Hz
- B. 5,000 Hz
- C. 10,000 Hz
- D. 2,500 Hz

Answer: A

Explanation:
depends on the angle between the ultrasound beam and the direction of blood flow. The Doppler equation includes a cosine function of the angle of insonation (). At 60 degrees, the cosine is 0.5, and at 0 degrees (parallel to the flow), the cosine is 1. Thus, if the Doppler shift is 10,000 Hz at 60 degrees, it would double to 20,000 Hz at 0 degrees because the cosine of 0 degrees is 1 (cos(0°) = 1) and the cosine of 60 degrees is 0.5 (cos(60°) = 0.5). The formula is: Doppler shift at 0 degrees = Doppler shift at 60 degrees / cos(60 degrees) = 10,000 Hz / 0.5 = 20,000 Hz.
Reference: ARDMS Sonography Principles and Instrumentation (SPI) Review, Doppler Shift and Angle of Insonation section.

NEW QUESTION # 76
Which resolution is degraded with multiple electronic foci?

- A. Temporal
- B. Lateral
- C. Elevational
- D. Axial

Answer: A

Explanation:

Comprehensive and Detailed Explanation From Exact Extract:
Using multiple focal zones improves lateral resolution but requires additional time for each focal zone acquisition, which reduces frame rate and therefore degrades temporal resolution.
According to sonography instrumentation reference:
"Multiple focal zones improve lateral resolution but at the expense of temporal resolution due to longer acquisition time for each frame." Therefore, the correct answer is D: Temporal.

NEW QUESTION # 77
What occurs when the pulse repetition frequency is less than twice the Doppler shift frequency?

- A. Propagation speed artifact
- B. Aliasing
- C. Range ambiguity
- D. Spectral broadening

Answer: B

Explanation:
Comprehensive and Detailed Explanation From Exact Extract:
Aliasing happens in Doppler ultrasound when the Doppler shift frequency exceeds half of the pulse repetition frequency (the Nyquist limit). When PRF is too low for the measured Doppler shift, the signal wraps around, producing aliasing.
According to sonography instrumentation reference:
"Aliasing occurs when the Doppler shift frequency exceeds one-half the pulse repetition frequency (Nyquist limit). This results in incorrect display of flow direction and velocity." Therefore, the correct answer is C: Aliasing.
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NEW QUESTION # 78
During a color Doppler scan, which angle to flow would most likely result in no color being visualized?

- A. 45 degrees
- B. 3 degrees
- C. 88 degrees
- D. 175 degrees

Answer: C

Explanation:
Color Doppler imaging is most effective when the angle between the ultrasound beam and the flow of blood is small.
At an angle of 88 degrees, the flow of blood is nearly perpendicular to the ultrasound beam.
When the angle is close to 90 degrees, the Doppler shift (frequency change) approaches zero, resulting in little to no color being visualized on the Doppler image.
Thus, to obtain a color signal, the angle should be optimized to be as close to 0 degrees as possible, with 60 degrees being the practical limit for accurate Doppler measurements. Reference:
ARDMS Sonography Principles and Instrumentation guidelines on Doppler angle and its effect on Doppler imaging.

NEW QUESTION # 79
Which color Doppler control allows for reassignment of red and blue to represent flow direction?

- A. Color priority
- B. Color gain
- C. Color threshold
- D. Color invert

Answer: D

Explanation:
Comprehensive and Detailed Explanation From Exact Extract:
In color Doppler imaging, the default color map assigns red and blue to represent flow direction relative to the transducer (usually

red toward, blue away). The color invert control reverses this assignment.
According to sonography Principles and Instrumentation:
"The color invert control reverses the baseline of the color map, swapping red and blue assignments for flow direction."
* Color priority adjusts the overlay of color vs grayscale.
* Color gain controls amplification of the Doppler signal.
* Color threshold sets minimum amplitude to display color.
Therefore, the correct answer is D: Color invert.
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NEW QUESTION # 80
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