Practice quiz: ASNT NDT Level II, Ultrasonic Testing (UT) General exam

6 questions. The answer key is on page 2.

Name _____ Date _____

1. **Invented example: a 70 degree angle probe on flat plate 15 mm thick, range calibrated in material sound path. An indication peaks at a sound path of 60 mm. Using flat parallel-wall geometry, how deep is the reflector below the scanning surface (nearest 0.1 mm)?**
   A. 20.5 mm
   B. 5.5 mm
   C. 56.4 mm
   D. 9.5 mm

2. **A planar indication gives a low echo when scanned from side A of the weld and a high echo from side B. What is the most likely explanation?**
   A. The probe on side A has a lower frequency
   B. The flaw is volumetric, so it should look the same from every scan angle
   C. The flaw is tilted so that it faces the beam from side B more squarely
   D. The time base is calibrated differently on each side

3. **Scanning a single-V butt weld that has a protruding root bead, you see an echo at the end of the first leg from both sides. Plotted on a cross-section, it lands about 1 mm below the back surface, directly under the weld root. What is the best interpretation?**
   A. A geometric echo from the root bead, as it plots outside the plate
   B. Incomplete penetration at the root, since it shows from both sides of the weld
   C. Cluster porosity near the cap, since the echo appears at the end of a leg
   D. A lamination in the parent plate, since it plots close to the back surface

4. **In immersion testing of seamless tube, how is an angled wave produced that travels around the tube wall to find axial discontinuities?**
   A. Increase the water path until the second front-surface echo moves past the tube's back wall
   B. Shift the probe off the tube centerline so the beam strikes the curved surface at an angle
   C. Raise the test frequency until the beam narrows enough to stay inside the wall thickness
   D. Aim the beam through the tube centerline so it enters the wall at normal incidence

5. **Compared with a lightly damped transducer of the same nominal frequency, a heavily damped transducer generally produces**
   A. a longer pulse with a narrower bandwidth
   B. a longer pulse with a wider bandwidth
   C. a shorter pulse with a wider bandwidth
   D. a shorter pulse with a narrower bandwidth

6. **A technician measuring remaining wall in thin, corroded pipe switches from a single-element contact probe to a dual-element probe. What is the main gain from the switch?**
   A. It needs no couplant, since the two elements touch the part directly
   B. It produces a shear wave in the part without a wedge
   C. It removes the need to set the material velocity before testing
   D. Separate send and receive elements improve near-surface resolution

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Answer key

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1. **D** Key: one leg is 15 / cos70 = 43.86 mm of path, so 60 mm is on the second leg.
2. **C** A planar flaw reflects most when the beam meets it squarely.
3. **A** Key: the echo plots below the back surface, outside the plate, where only the protruding root bead is, so it is a geometric echo from the bead.
4. **B** Key: moving the beam off the centerline makes it meet the curved surface at an angle, and refraction turns that into an angled wave in the wall that travels around the circumference, square on to axial flaws.
5. **C** Key: heavy backing damping stops the crystal ringing quickly, so the pulse is short, and a short pulse in time contains a wide spread of frequencies (broadband, low Q).
6. **D** In a dual-element probe one element transmits and the other receives, so the receiver is not blinded by the initial pulse and near-surface echoes from thin walls can be read.

Full explanations

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