



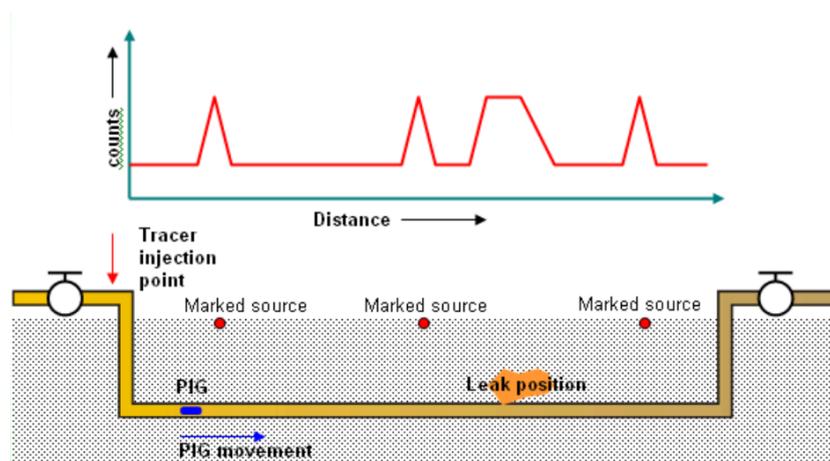
**UNIVERSITY OF SCIENCE, VNU HCM**  
**FINAL EXAMINATION**  
**Semester 1 - Academic Year 2023-2024**

<b>STORAGE</b> <b>CODE</b> (to be filled by the QA-AE department)
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situation. Present the steps (measurement principle, isotopes used and experimental layout and advantages of this method).

***Solution:***

- The technique can be used: Radioisotope radiography (RIR) is a method of surveying processes by introducing suitable radiopharmaceutical compounds along with materials into the system to investigate the movement and transformation processes of the system through a radiation measurement system without the need to halt production operations.
- The system: A small amount of gamma-emitting tracer material is pumped in pulses into a pipeline to create a radioactive "piston," followed by a detector "probe" to detect any radiation leakage into the environment. The probe is capable of recording radiation counts over time and storing the data in its memory. Based on the probe's movement speed and the timing of detecting excess radiation, the location of the leakage in the underground pipeline can be determined.



**Question 3 (3 points):**

- a. State the general principle of the ultrasound method. (2 points)
- b. An employee wants to check the thickness of a metal plate, which type of probe should he use in the ultrasonic method? Suppose this employee uses the IIWV1 standard plate (see Appendix), and uses a range of 150mm. How many reflected pulses are there on the device screen and how many millimeters are each pulse apart? (1 point)

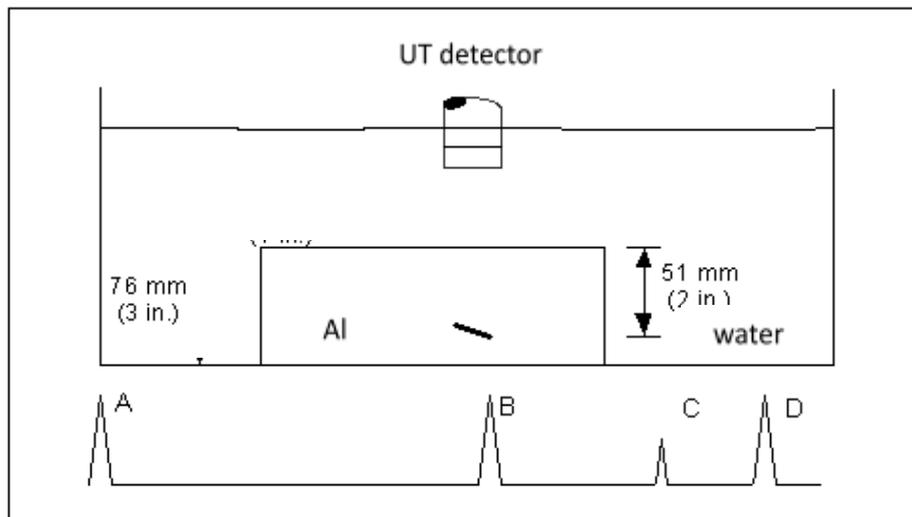
***Solution:***

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- a. The general principle of the ultrasound method: When high voltage is applied, a piezoelectric crystal "vibrates" at its resonant frequency and generates short high-frequency pulses. Ultrasonic waves, high-frequency sound waves, are transmitted into the test material, reflected from surfaces/discontinuities. The energy of the reflected sound is detected by the equipment, processed, and displayed corresponding to the propagation time and the size of the reflecting surface, indicating the presence, location, and size of defects.
- b. The number of reflected pulses can be seen:  $150/25 = 6$  pulses  
Distance between two pulses: 25 mm.

**Question 4 (2 points):** Given the following picture:



- a. State the meaning of the indicator pulses A, B, C and D. (1 point)
- b. Calculate the distance from indicator C to indicator D (give detailed calculation method). (1 point)

***Solution:***

- a. The meaning of the indicator pulses

Pulse A: initial pulse

Pulse B: reflected pulse from the front surface of the Aluminium plate

Pulse C: reflected pulse from the defect inside the Aluminium plate

Pulse D: reflected pulse from the back surface of the Aluminium plate

- b. Calculate the distance from indicator C to indicator D:  $76 - 51 = 25$  mm

**---THE END---**