

RADIOGRAPHY X-RAY TUBE PUZZLE

UNIT - 5

TOPIC - X-RAY TUBE

TOTAL MARKS - 10 MARKS

Puzzle: Deduction Den (Reasoning Puzzle Pathway Puzzle) - X-ray Tube Troubleshooting Quest

In this gaming puzzle, you're a radiology technician in a high-stakes diagnostic lab. Three X-ray tubes have malfunctioned during real procedures, showing specific symptoms. Use your knowledge of X-ray tube components (cathode filament, rotating anode, vacuum envelope) to deduce the root cause and match each tube to the correct failure type. Navigate all three to unlock the "perfect image" and win the quest!

- **Tube A:** During a chest X-ray, the tube suddenly stops producing X-rays. The filament was observed glowing excessively bright before going dark, with no arcing or overheating noted on the anode.
- **Tube B:** In a prolonged fluoroscopy session, the tube overheats rapidly, leading to blurred images and visible pitting/cracks on the anode surface after inspection, despite normal filament function.
- **Tube C:** While imaging a fracture, sudden electrical arcing occurs inside the tube with a hissing sound, causing high-voltage breakdown and no X-ray output, but the filament and anode appear intact externally.

Available diagnoses: Filament burnout (overcurrent/thermionic overload), Anode damage (overheating from poor rotation/cooling), Vacuum breach (gas leakage leading to arcing).

Question 1: Match Tube A to the correct diagnosis and explain why in 1-2 sentences (3 marks).

Question 2: Match Tube B to the correct diagnosis and explain why in 1-2 sentences (3 marks).

Question 3: Match Tube C to the correct diagnosis and explain why in 1-2 sentences (4 marks).

RUBRICS:

Criterion	Marks (out of 10)
Accuracy	4
Logical reasoning / Applying	3
Conceptual understanding	2
Presentation	1
Total Marks	10 Marks