

List of potential topics for radiation technology essay competition:

### **Medicine**

1. Digital radiography (x-ray imaging)
2. Mammography
3. Bone density scanning (Dual-energy X-ray absorptiometry - DEXA)
4. Computed tomography (CT) scanning
5. Positron emission tomography (PET) imaging
6. Single-photon emission computed tomography (SPECT) imaging
7. Fluoroscopy
8. Megavoltage x-ray radiation therapy (linear accelerators)
9. Proton therapy
10. Carbon ion therapy
11. Brachytherapy
12. Gamma knife surgery
13. Stereotactic body radiation therapy (SBRT)
14. Nuclear medicine (e.g. I-131 treatment)
15. Radioimmunotherapy
16. Cyclotron (radiopharmaceutical development)
17. Gamma camera imaging
18. Boron neutron capture therapy (BNCT)

### **Radiation Processing and Material Effects**

19. Food irradiation for preservation
20. Sterilization of medical equipment using gamma radiation
21. Radiation-induced polymerization
22. Electron beam processing for materials modification (e.g. textiles, color centered in crystals, etc)
23. Radiation vulcanization of rubber (RVR)
24. Irradiation of blood for transfusion
25. Mail or package irradiation
26. Radiation hardening of electronic components
27. Radiation-induced color centers in crystals
28. Radiation-induced defects in materials
29. Radiation-induced polymer degradation
30. Neutron radiography
31. Prompt gamma neutron activation analysis
32. Mössbauer spectroscopy
33. Positron annihilation spectroscopy
34. X-ray crystallography

### **Scientific Research**

35. Electron microscopy
36. Neutron scattering experiments
37. Radioactive tracer studies
38. Gamma spectroscopy
39. Positron emission particle tracking (PEPT)
40. Carbon dating

**Radiation Protection and Homeland Security**

41. Lead shielding for radiation protection
42. Personal protective equipment (PPE) for radiation workers
43. Radiation monitoring devices (dosimeters)
44. Portal monitors for screening cargo and vehicles
45. Radiation isotope identification devices (RIIDs)
46. Nuclear forensics
47. Bonner spheres
48. Cargo and baggage inspection using X-ray scanners

**Nuclear Power and Space Applications**

49. Nuclear power reactors
50. Nuclear fuel cycle
51. Radioisotope power systems (e.g., RTGs)
52. Gamma-ray spectrometry in planetary exploration

**Miscellaneous**

53. Smoke detectors (Americium)
54. Monte Carlo radiation transport simulations