

PRACTICE SET
End Semester Examination, Dec - 2025

Program: BMRIT
Semester: I
Course: Basics of Radiation Physics
CourseCode: 42BBMRIT003

Course Outcomes	Description
CO1	Understand the fundamental principles of general physics as they relate to medical imaging, including concept of radiation.
CO2	Differentiate the various forms of general radiation by examining their nature, sources, energy levels, and interactions with matter.
CO3	Identify the fundamental components and construction of radiology equipment.
CO4	Interpret quality control of radiology equipment.
CO5	Differentiate between x-ray equipment and other radiology related equipment.
CO6	Describe the production of x-rays.
CO7	Describe the circuit system of radiology equipment.

Section- A (30 x 5=150)

1. Define Force and Energy. Explain their relationship. [Module-I, CO1, Remember, LOT]
2. Describe the concept of Electromagnetic Radiation. [Module-I, CO1, Understand, LOT]
3. What are isotopes and how do they differ from isobars? [Module-I, CO1, Remember, LOT]
4. Define Work, Power, and Energy with SI units. [Module-I, CO1, Remember, LOT]
5. Discuss the electromagnetic spectrum and its medical significance. [Module-I, CO1, Understand, LOT]
6. Explain the concept of Binding Energy. [Module-I, CO1, Understand, LOT]
7. Explain the concept of ionization and excitation. [Module-I, CO1, Understand, LOT]
8. Explain Fluorescence and its diagnostic use. [Module-I, CO1, Understand, LOT]
9. Explain the charge and discharge of a capacitor through resistance and inductance. [Module-II, CO2, Analyze, HOT]
10. Express Coulomb's Law and its applications. [Module-II, CO2, Understand, LOT]
11. Describe the principle of Ohm's Law. [Module-II, CO2, Remember, LOT]

12. Explain the principle of electromagnetic induction. [Module-II, CO2, Understand, LOT]
13. Analyze the concept of electromagnetic wave propagation. [Module-II, CO2, Analyze, HOT]
14. Describe the structure and function of semiconductors. [Module-III, CO3, Understand, LOT]
15. Illustrate forward and reverse biasing in a diode. [Module-III, CO3, Apply, LOT]
16. Classify Half-wave and Full-wave rectifiers. [Module-III, CO3, Analyze, HOT]
17. Illustrate the transistor as an amplifier. [Module-III, CO3, Apply, LOT]
18. Explain the feedback mechanism in amplifiers. [Module-III, CO3, Analyze, HOT]
19. Explain the construction of an X-ray tube. [Module-IV, CO4, Analyze, HOT]
20. Explain the Bremsstrahlung and Characteristic X-rays. [Module-IV, CO4, Understand, LOT]
21. Define thermal conductivity and mention its application in radiology. [Module-V, CO5, Remember, LOT]
22. Illustrate Newton's law of cooling and its application in radiology. [Module-V, CO5, Apply, LOT]
23. Define specific heat and explain its significance. [Module-V, CO5, Remember, LOT]
24. Explain the law of Exponential Attenuation. [Module-VI, CO6, Analyze, HOT]
25. Explain photon interactions with matter. [Module-VI, CO6, Analyze, HOT]
26. Discuss Compton scattering and its significance. [Module-VI, CO6, Understand, LOT]
27. Describe the Photoelectric effect. [Module-VI, CO6, Understand, LOT]
28. Define Half Value Layer (HVL) and its significance. [Module-VII, CO7, Remember, LOT]
29. Explain the term LET and its importance in radiology. [Module-VII, CO7, Analyze, HOT]
30. Explain the concept of energy flux density. [Module-VII, CO7, Analyze, HOT]

Section- B

(15x10=150)

31. Discuss the electromagnetic theory of light. [Module-I, CO1, Understand, LOT]
32. Describe the relationship between energy, wavelength, and frequency. [Module-I, CO1, Understand, LOT]
33. Illustrate the behavior of electrons in a magnetic field. [Module-II, CO2, Apply, LOT]
34. Explain the growth and decay of current in LR circuits with derivation. [Module-II, CO2, Analyze, HOT]
35. Analyze Maxwell's equations and their relevance to electromagnetic waves. [Module-II, CO2, Analyze, HOT]
36. Express different types of semiconductors with examples. [Module-III, CO3, Understand, LOT]
37. Explain the principle and working of a rectifier circuit. [Module-III, CO3, Analyze, HOT]
38. Analyze the process of X-ray production. [Module-IV, CO4, Analyze, HOT]
39. Compare the nature of soft and hard X-rays. [Module-IV, CO4, Understand, LOT]
40. Design a neat labelled diagram of an X-ray tube. [Module-IV, CO4, Create, HOT]
41. Prepare a chart of various heat transfer mechanisms in diagnostic radiology. [Module-V, CO5, Apply, LOT]
42. Analyse the differences between Photoelectric and Compton effects. [Module-VI, CO6, Analyze, HOT]
43. Compare the attenuation properties of bone and soft tissue. [Module-VI, CO6, Analyze, HOT]
44. Compare between coherent and incoherent scattering. [Module-VI, CO6, Understand, LOT]
45. Design an experiment to measure HVL. [Module-VII, CO7, Create, HOT]

Section C

(10 x 20=200)

46. Evaluate the fundamental concepts of atomic structure and radiation interaction. [Module-I, CO1, Evaluate, HOT]
47. Illustrate the principles of electromagnetic induction in medical imaging. [Module-II, CO2, Apply, LOT]
48. Design a schematic for a regulated power supply in X-ray equipment. [Module-III, CO3, Create, HOT]
49. Evaluate the effect of filtration and heel effect on X-ray quality. [Module-IV, CO4, Evaluate, HOT]
50. Describe quality control procedures for radiology equipment. [Module-IV, CO4, Understand, LOT]
51. Compare various radiation-matter interaction processes and their clinical significance. [Module-VI, CO6, Analyze, HOT]
52. Analyze the relationship between energy, wavelength, and photon penetration in human tissue. [Module-VI, CO6, Analyze, HOT]

53. Analyze the complete circuit system of radiology equipment. [Module-VII, CO7, Analyze, HOT]

54. Design a detailed experiment to measure Half Value Layer (HVL) and Tenth Value Layer (TVT). [Module-VII, CO7, Create, HOT]

[Module-VII, CO7, Create, HOT]

55. Evaluate different types of radiation detectors used in diagnostic radiology. [Module-VII, CO7, Evaluate, HOT]

Summary Sheet

CO Wise

CO	Q. No	Marks
CO1	1,2,3,4,5,6,7,8,31,32,46	80
CO2	9,10,11,12,13,33,34,35,47	75
CO3	14,15,16,17,18,36,37,48	65
CO4	19,20,38,39,40,49,50	80
CO5	21,22,23,41	25
CO6	24,25,26,27,42,43,44,51,52	90
CO7	28,29,30,45,53,54,55	85
Total		500

Unit Wise

Unit	Q. No	Marks
Module- I	1,2,3,4,5,6,7,8,31,32,46	80
Module- II	9,10,11,12,13,33,34,35,47	75
Module- III	14,15,16,17,18,36,37,48	65
Module- IV	19,20,38,39,40,49,50	80
Module- V	21,22,23,41	25
Module- VI	24,25,26,27,42,43,44,51,52	90
Module- VII	28,29,30,45,53,54,55	85
Total		500

Blooms Taxonomy Level (BTL) Wise

BTL	Q. No.	Marks
LOT	1,2,3,4,5,6,7,8,10,11,12,14,15,17,20,21,22,23,26,27,28,31,32,33,36,39,41,44,47,50	215
HOT	9,13,16,18,19,24,25,29,30,34,35,37,38,40,42,43,45,46,48,49,51,52,53,54,55	285
Total		500

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Disclaimer: - This is a Practice Set. The Question in End term examination will differ from the Practice set. This Practice set is meant for practice only.