Rajiv Gandhi University of Health Sciences, Karnataka

II Year B.Sc. Radiotherapy Technology Degree Examination – 17-May-2023

Time: Three Hours | Max. Marks: 60 Marks

RADIOTHERAPY (Part– I – A)
FUNDAMENTAL OF PHYSICS (RS - 3)
Q.P. CODE: 1356

Your answers should be specific to the questions asked
Draw neat, labeled diagrams wherever necessary

LONG ESSAYS (Answer any Two) 2 x 10 = 20 Marks

1. Explain Radioactivity and properties of Alpha, beta **and** gamma **rays**
2. Explain transformer losses
3. Principle and working of nuclear reactor

SHORT ESSAYS (Answer any FIVE) 5 x 5 = 25 Marks

4. Properties of radium and its daughter elements
5. Radioactive equilibrium
6. Thermionic emission
7. **Factors** affecting the transmission lof homogenous beam
8. Compton effect
9. Series and parallel resistance in combination with potential difference
10. Half life and Mean life

SHORT ANSWERS (Answer any FIVE) 5 x 3 = 15 Marks

11. Space charge effect
12. Specific gamma ray emission
13. **Strategies** of radiation protection
14. soft and hard X rays
15. Mass absorption coefficient
16. REM and Sievert
17. Atomic and Mass number

Rajiv Gandhi University of Health Sciences, Karnataka

II Year B.Sc. Radiotherapy Technology Degree Examination – 17-May-2023

Time: Three Hours | Max. Marks: 100 Marks

Radiotherapy - Part – I A (RS-4)

Q.P. CODE: 3285

Your answers should be specific to the questions asked.
Draw neat labeled diagrams wherever necessary

LONG ESSAYS (Second Question Choice) 2 x 10 = 20 Marks

1. Write in detail about radioactive equilibrium.
2. Construction and working **of** different types of transformers**..**
   Or
   Discuss about Dosimetric qualities **and principles.**

SHORT ESSAYS (Question No 5 & 10 choice) 10 x 5 = 50 Marks

3. Coherent scattering and pair production.
4. Methods of **cooling of** X-ray tubes**.**
5. Explain briefly the production of x-rays.
   OR
   Ohm's law and Kirchhoff's law.
6. Mutual induction and self-induction.
7. Factor effecting quality of x-rays.
8. Artificial radioactivity.
9. Explain equivalent dose **and** effective dose**..**
10. Explain full wave and half wave rectification.
    OR
    Parallel and series capacitor.
11. Write a note on **radiation**
12. Semi conductors.

SHORT ANSWER 10 x 3 = 30 Marks

13. TVL & HVL
14. LET
15. Coulomb's law.
16. Inverse square law.
17. 3DCRT
18. Radioactivity and units.
19. Ionization and excitation.
20. Thermionic emission.
21. Nuclear fusion.
22. Anode heel effect.

Rajiv Gandhi University of Health Sciences, Karnataka

II Year B.Sc. Radiotherapy Technology Degree Examination – 19-May-2023

Time: Three Hours | Max. Marks: 50 Marks

Radiotherapy - Part – I B (RS-4)
Radiation Biology & Applied Anatomy and Pathology
Q.P. CODE: 3286

Your answers should be specific to the questions asked.
Draw neat labeled diagrams wherever necessary

LONG ESSAYS (Answer any one) 1 x 10 = 10 Marks

1. Describe in detail anatomy of Breast. Explain the pathology and tumor spread of cancer Breast.
2. Discuss in detail about 5R's of Radiobiology.

SHORT ESSAYS (Answer any five) 5 x 5 = 25 Marks

3. Chromosomal aberration.
4. Etiology of Esophageal cancer.
5. Explain the types of radiation and its biological effect.
6. Epidemiology and Aetiology of Head and Neck tumors.
7. Mode of spread of cancer.
8. Describe cell cycle and explain in detail **the** radiation **effects** on cell cycle.

SHORT ANSWER 5 x 3 = 15 Marks

9. Radiation protection.
10. Therapeutic ratio.
11. Type of cell damages.
12. Cell survival curve.
13. Describe skin cancer.

II Year B.Sc. Radiotherapy Technology Degree Examination – 19-May-2023

Time: Three Hours | Max. Marks: 50 Marks

Radiotherapy - Part – I B (RS-4)
Principles of Radiotherapy
Q.P. CODE: 3287

Your answers should be specific to the questions asked
Draw neat labeled diagrams wherever necessary

LONG ESSAYS (Answer any one) 1 x 10 = 10 Marks

1. Describe the acute effects of radiation and their management
2. Discuss the clinical signs and symptoms of a patient with carcinoma of the lung. Describe the simulation and radiotherapy planning of the same patient by IMRT technique

SHORT ESSAYS (Answer any five) 5 x 5 = 25 Marks

3. Discuss the steps taken during the IMRT planning for a patient with carcinoma of the Nasopharynx
4. Describe the acute side effects in a patient on **Chemotherapy & Radiotherapy** for carcinoma of the oral cavity.
5. Discuss the care and assistance of a patient who is sedated
6. Discuss the late effects of radiotherapy in a patient with carcinoma of the esophagus. What precautions are taken to reduce the late effects in the same patient?
7. Discuss the clinical signs and symptoms of a patient **with Carcinoma of Rectum.**
8. Discuss the differences between conventional and CT simulation

SHORT ANSWER 5 x 3 = 15 Marks

9. Hypofractionation
10. Febrile neutropenia
11. Cancer cachexia
12. Xerostomia
13. Mouth bite

Rajiv Gandhi University of Health Sciences, Karnataka

Third Year B.Sc. Radiotherapy Technology Degree Examination – 16-May-2023

Time: Three Hours | Max. Marks: 100 Marks

RADIOTHERAPY – PAPER – II A (RS-4)
Q.P. CODE: 3288

Your answers should be specific to the questions asked
Draw neat labeled diagrams wherever necessary

LONG ESSAYS (Second Question Choice) 2 x 10 = 20 Marks

1. Describe the various interaction of radiation with matter
2. Explain in the components of HDR Brachytherapy machine and brief its clinical applications
   OR
   Describe in detail about primary, secondary and tertiary **COLLIMATOR** system

SHORT ESSAYS (Question No 5 & 10 choice) 10 x 5 = 50 Marks

3. Describe linear energy transfer and relative biological effectiveness
4. Application of IMRT
5. Personal monitoring system
   OR
   Treatment time and Isodose calculation
6. Brachytherapy sources
7. X-ray production
8. Respiratory gating
9. Write a note on 3DCRT
10. What are the daily quality assurance (QA) procedures for LINAC?
    OR
    Electron beam therapy
11. Discuss steps taken to minimize radiation exposure to public and radiation workers in a RT department
12. Bremsstrahlung and characteristic X-rays

SHORT ANSWER 10 x 3 = 30 Marks

13. Bolus
14. Thermoplastic mould
15. Wedges
16. Tissue compensators
17. TLD badge
18. Hyperbaric oxygen therapy
19. Therapeutic ratio
20. Integral dose
21. MLC
22. ALARA

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Rajiv Gandhi University of Health Sciences, Karnataka

Third Year B.Sc. Radiotherapy Technology Degree Examination – 18-May-2023

Time: Three Hours Max. Marks: 100 Marks

RADIOTHERAPY – PAPER – II B (RS-4)
Q.P. CODE: 3289

Your answers should be specific to the questions asked
Draw neat labeled diagrams wherever necessary

LONG ESSAYS (Second Question Choice) 2 x 10 = 20 Marks

1. Explain the radiotherapeutic management in treatment of seminoma
2. Steps involved in preparing a patient for Brachytherapy

   OR

   Discuss the importance of 3D image verification over 2D verification with some examples

SHORT ESSAYS (Question No 5 & 10 choice) 10 x 5 = 50 Marks

3. Advantages and challenges of image guided radiation therapy
4. Describe the emergencies in radiation oncology
5. Safety practicing in radiotherapy

   OR

   Stereotactic body radiotherapy and its fractionation regime
6. steps involved in QA of CBCT
7. Radiotherapy for Benign tumors
8. Difference between SSD and SAD setup
9. Explain the aseptic techniques used in OT to prevent infection
10. CT simulation for Ca esophagus

    OR

    Adaptive radiotherapy
11. Discuss the various rehabilitation programs for cancer patients
12. Explain the various Brachytherapy techniques

SHORT ANSWER 10 x 3 = 30 Marks

13. Amifostine
14. Gross tumor volume
15. TNM staging
16. Paediatric Radiotheraphy
17. bone tumors
18. Support group in cancer care
19. Institutional review board
20. cell survival cure
21. Respiratory gating technique
22. Systemic error and random error

Rajiv Gandhi University of Health Sciences, Karnataka

II Year B.Sc. Radiotherapy Technology Degree Examination – 19-May-2023

Time: 3 Hours Max. Marks: 30 Marks

Radiation Biology, Applied Anatomy and Pathology (RS-3)

Q.P. CODE: 1357

Your answers should be specific to the questions asked.
Draw neat, labeled diagrams wherever necessary.
(Note: Both QP Codes 1357 and 1358 are to be answered within total duration of 3 hours)

LONG ESSAYS (Answer any One) 1 x 10 = 10 Marks

1. What is cell survival curve? How do you derive it? What are the different factors affecting the cell survival curve?
2. What are the etiological factors for lung cancer? Write about pathological classification of lung cancers.

SHORT ESSAYS (Answer any Two) 2 x 5 = 10 Marks

3. Discuss about various DNA damage and its repair mechanisms.
4. Various lymphnode stations involved in head and neck cancers.
5. Factors on which the tolerance of normal tissue to radiation depends.

SHORT ANSWERS (Answer any Five) 5 x 2 = 10 Marks

6. Radiation induced cancers.
7. Define linear energy transfer and give example of high LET radiation.
8. Hormone dependent cancers.
9. Oxygen effect.
10. TNM staging.
11. Deterministic effect.

II Year B.Sc. Radiotherapy Technology Degree Examination – 19-May-2023

Time: 3 Hours Max. Marks: 30 Marks

Principles of Radiotherapy (RS-3)

Q.P. CODE: 1358

Your answers should be specific to the questions asked.
Draw neat, labeled diagrams wherever necessary.
(Note: Both QP Codes 1357 and 1358 are to be answered within total duration of 3 hours)

LONG ESSAYS (Answer any One) 1 x 10 = 10 Marks

1. Describe the indications, technique, dose and complications of radiotherapy in GI tumors.
2. Describe any three immobilization devices and mention the possibility of errors with each of them.

SHORT ESSAYS (Answer any Two) 2 x 5 = 10 Marks

3. Early and late reaction on skin due to radiation.
4. Care of assistance during sedated pediatric patents in Radiotherapy.
5. What are the types of Brachytherapy? Mention suitable examples.

SHORT ANSWERS (Answer any Five) 5 x 2 = 10 Marks

6. Role of electron beam in cancer treatment.
7. Mention the late effects of radiation treatment.
8. Acute and chronic complications of local radiation therapy in breast cancer.
9. Name a few tumors that are common in children.
10. Colostomy care during radiotherapy.
11. Quality of life in cancer care.

Rajiv Gandhi University of Health Sciences, Karnataka

II Year B.Sc. Radiotherapy Technology Degree Examination – 23-Nov-2023

Time: Three Hours | Max. Marks: 60 Marks

RADIOTHERAPY (Part– I – A)
FUNDAMENTAL OF PHYSICS (RS - 3)
Q.P. CODE: 1356

Your answers should be specific to the questions asked
Draw neat, labeled diagrams wherever necessary

LONG ESSAYS (Answer any Two) 2 x 10 = 20 Marks

1. Draw a neat, labelled diagram of modern X ray tube and discus the physics of X-ray production
2. Discuss the principles of Nuclear Reactor. Explain the methods of production of radionuclides in a nuclear reactor with suitable examples
3. How is the transformer constructed? What are the types of transformers used in X-ray equipment?

SHORT ESSAYS (Answer any FIVE) 5 x 5 = 25 Marks

4. Enumerate the properties of X-rays
5. Define Isotopes, Isobars, Isomers, Isotones with examples
6. Magnetic effect of an Electric current
7. Compton effect
8. Define radioactivity and discuss about Radioactive Equilibrium
9. Define Linear attenuation coefficient and half value thickness. How do we calculate half value thickness by using linear attenuation coefficient?
10. Ionisation and excitation of an Atom

SHORT ANSWERS (Answer any FIVE) 5 x 3 = 15 Marks

11. Binding energy
12. Types of electromagnetic radiation with examples
13. Inverse Square Law
14. Ohm’s Law
15. Anode heel effect
16. Pocket Dosimeter
17. Interlocks

Rajiv Gandhi University of Health Sciences, Karnataka

II Year B.Sc. Radiotherapy Technology Degree Examination – 28-Nov-2023

Time: 3 Hours | Max. Marks: 30 Marks

Radiation Biology, Applied Anatomy and Pathology (RS-3)
Q.P. CODE: 1357

Your answers should be specific to the questions asked.
Draw neat, labeled diagrams wherever necessary.
(Note: Both QP Codes 1357 and 1358 are to be answered within total duration of 3 hours)

LONG ESSAYS (Answer any One) 1 x 10 = 10 Marks

1. Write in details about the mechanisms of radiation absorption with suitable diagrams.
2. Discuss the anatomy and lymphatic drainage of breast and aetiopathogenesis of breast cancer.

SHORT ESSAYS (Answer any Two) 2 x 5 = 10 Marks

3. What are the fours Rs of Radiobiology? How it is important in fractionation in external beam radiotherapy?
4. **Describe the effect of radiation on embryo & fetus with graph.**
5. Enumerate the differences between benign and malignant tumors.

SHORT ANSWERS (Answer any Five) 5 x 2 = 10 Marks

6. Name the phases of Cell cycle.
7. Define Oxygen enhancement ratio.
8. **Carcinogenesis.**
9. **Chromosomal aberrations**
10. **What does ALARA stand for in Radiotherapy ?**
11. **What are the typical symptoms associated with seminoma ?**

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II Year B.Sc. Radiotherapy Technology Degree Examination – 28-Nov-2023

Time: 3 Hours | Max. Marks: 30 Marks

Principles of Radiotherapy (RS-3)
Q.P. CODE: 1358

Your answers should be specific to the questions asked.
Draw neat, labeled diagrams wherever necessary.
(Note: Both QP Codes 1357 and 1358 are to be answered within total duration of 3 hours)

LONG ESSAYS (Answer any One) 1 x 10 = 10 Marks

1. Explain briefly about the management of cancer patient.
2. Explain the steps included in external radiation therapy.

SHORT ESSAYS (Answer any Two) 2 x 5 = 10 Marks

3. Explain the physical effects of Neoplasia on the body.
4. Explain the complications associated with cancer and its treatment.
5. Explain acute and late effects of radiation therapy.

SHORT ANSWERS (Answer any Five) 5 x 2 = 10 Marks

6. Types of Radiotherapy techniques used to manage cancer treatment.
7. Explain SAD and SSD technique.
8. Explain the concept of fractionation in Radiotherapy.
9. Explain HDR and LDR Brachytherapy.
10. Explain chemotherapy.
11. **What is the common radioactive sources used in Brachytherapy**

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Rajiv Gandhi University of Health Sciences, Karnataka

II Year B.Sc. Radiotherapy Technology Degree Examination – 23-Nov-2023

Time: Three Hours | Max. Marks: 100 Marks

Radiotherapy - Part – I A (RS-4)

Q.P. CODE: 3285

Your answers should be specific to the questions asked
Draw neat labeled diagrams wherever necessary

LONG ESSAYS (Second Question Choice) 2 x 10 = 20 Marks

1. Describe the structure of an atom. Explain the properties of the various components of an atom
2. Enumerate the various radioactive nuclides used in medicine. List the properties of each of them and clinical uses of each
   OR
   Describe in detail about dosimetric quantities and protection quantities

SHORT ESSAYS (Question No 5 & 10 choice) 10 x 5 = 50 Marks

3. Discuss the photoelectric effect
4. Discuss the production and properties of X-rays
5. Describe the physics of a radiograph
   OR
   Explain alternating current with its uses
6. Line focus principle
7. Discuss the graphical representation of data in a semi log plot
8. Discuss the properties of radium and its uses
9. Discuss electromagnetic induction
10. **Explain the structure and working principle of a full – wave bridge rectifier**
    OR
    Explain the construction and working of a modern x-ray tube
11. Discuss the factors affecting transmission of an x-ray beam through an object
12. Discuss the design of an A.C. transformer and its theory

SHORT ANSWER 10 x 3 = 30 Marks

13. LET
14. Properties of iodine 131
15. Periodic table
16. Inverse square law
17. KERMA
18. Roentgen
19. Dose equivalent
20. Half value thickness
21. Half life
22. Coulombs law

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