[KM 150]

Sub. Code: 2047

#### M.D. DEGREE EXAMINATION.

Branch IX - Radiotherapy

Part II - Preliminary

# MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY

Time: Three hours

Maximum: 100 marks

Theory: Two hours and

Theory: 80 marks

forty minutes

M.C.Q.: Twenty minutes

M.C.Q. : 20 marks

Answer ALL questions.

Draw suitable diagrams wherever necessary.

I. Essay questions :

 $(2 \times 15 = 30)$ 

- (1) Discuss the construction and working of medical linear accelerator.
- (2) Discuss in detail on treatment planning system with special mention to 3D conformal radiotherapy planning.
- II. Short notes questions :

 $(10 \times 5 = 50)$ 

- (a) Characteristics of isotopes used in brachytherapy
  - (b) Nuclear fission

- (c) Half Value Layer (HVL)
- (d) Orthogonal Imaging Method
- (e) Absorbed dose and integral dose
- (f) TAR/TMR and Percentage Depth Dose (PDD)
- (g) Maximum Permissible Limits (MPL)
- (h) Personal Monitoring Devices
- (i) Beam modifiers
- (i) Radiation detectors.

[KO 150]

Sub. Code: 2049

M.D. DEGREE EXAMINATION.

Branch IX - Radiotherapy

MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY

Time: Three hours Maximum: 100 marks

Theory: Two hours and Theory: 80 marks

forty minutes

M.C.Q.: Twenty minutes M.C.Q.: 20 marks

Answer ALL questions.

Draw suitable diagrams wherever necessary.

I. Essay questions :

 $(2 \times 15 = 30)$ 

- (1) (a) Compare Telecobalt machine with linear accelerator and highlight their merits and demerits in clinical practice.
- (b) What are the quality assurance tests for such units in clinical practice?
- (2) What is particle therapy? Discuss various particle beams used in Modern clinical practice.

II. Short notes :

 $(10 \times 5 = 50)$ 

- (a) Radiation sources used in Brachy therapy.
- (b) Wedge filters.
- (c) Electron beam therapy.
- (d) Define Half life, Mean life and Specific Activity.
  - (e) Photoelectric effect.
  - (f) TL Dosimetry.
  - (g) Percentage depth dose.
  - (h) Electronic portal imaging.
  - Dose limit for public and radiation workers.
  - Paterson Parker system.

[KP 150]

Sub. Code: 2047

#### M.D. DEGREE EXAMINATION.

### Branch IX — Radiotherapy

Part II — Preliminary

### MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY

Time: Three hours

Maximum: 100 marks

Theory: Two hours and

Theory: 80 marks

forty minutes

M.C.Q.: Twenty minutes

M.C.Q.: 20 marks

Answer ALL questions.

Draw suitable diagrams wherever necessary.

### I. Essay questions :

- (1) Explain with the help of suitable cross sectional diagram, the design and working of a teletherapy machine with a Co-60 radioisotope. What are the various disadvantages of Tellecobalt machines as compared to linear accelerators. (20)
- (2) Explain in detail the radiobiology of LDR, MDR and HDR brachytherapy with reference to cancer of the uterine cervix. (15)

(3) What is Mega voltage radiation? Discuss the construction of loom and installation of High energy linear accelerator. (15)

### II. Short notes:

 $(6 \times 5 = 30)$ 

- (a) Tissue maximum ratio.
- (b) Shielding blocks.
- (c) Inverse Square law.
- (d) Effective dose equivalent
- (e) Annual maximum permissible close limits.
- (f) Wedges.

[KQ 180]

Sub. Code: 2049

#### M.D. DEGREE EXAMINATION.

# Branch IX — Radiotherapy

## Paper I — MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY AND RADIATION BIOLOGY

(Candidates admitted from 2004-05 onwards)

Time: Three hours Maximum: 100 marks

Theory: Two hours and Theory: 80 marks

forty minutes

M.C.Q.: Twenty minutes M.C.Q.: 20 marks

# Answer ALL questions.

Draw suitable diagrams wherever necessary.

### Essay questions :

- Describe the physical properties of alpha, beta, gamma rays and their absorption in matter and the methods of detection.
- (2) Draw a block diagram of linear accelerator and describe briefly the functions of the various parts and the clinical applications. (15)

(3) Mention factors that modify radiation response and discuss in detail radio sensitizers and their mechanism of action. (15)

## II. Short notes :

 $(6 \times 5 = 30)$ 

- (a) Manchester system
- (b) RBE and fractionation
- (c) Radiation survey in a teletheraphy facility
- (d) IMRT clinical application
- (e) Radiation protection rules in India
- (f) Rotation and are therapy.

[KR 150]

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II. Short notes:

 $(6 \times 5 = 30)$ 

### M.D. DEGREE EXAMINATION.

Branch - IX - Radiotherapy

# Paper I — MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY AND RADIATION BIOLOGY

(Candidates admitted from 2004-05 onwards)

Time: Three hours

Maximum: 100 marks

Theory: Two hours and

Theory: 80 marks

forty minutes

M.C.Q.: Twenty minutes

M.C.Q. : 20 marks

Answer ALL questions.

Draw suitable diagrams whenever necessary.

- I. Essay:
- Discuss the role of adjuvant radiotherapy in Oncologic practice. Narrate giving two examples. (20)
- 2. Discuss the radiobiologic basis of radiation. (15)
- 3. Write an account on altered radiation fractionation. (15)

- (a) Radio-sensitizers
- (b) Apoptosis
- (c) Clinical trials
- (d) Electron beam therapy
- (e) Hyperthermia and radiation
- (f) Therapeutic ratio.

## **MARCH 2008**

[KS 140] Sub. Code: 2035

### M.D. DEGREE EXAMINATION.

Branch IX — Radiotherapy

Paper I — MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY AND RADIATION BIOLOGY

Common to all Regulations

Q.P.Code: 202035

Time: Three hours Maximum: 100 marks

Answer ALL questions.

I. Essay:  $(2 \times 20 = 40)$ 

- 1. Give an account of Radiation protection as relevant to Radiation oncology practice. (20)
- 2. Name the various brachytherapy implant dosimetry systems and describe any one in detail. (20)
- II. Short notes:  $(10 \times 6 = 60)$ 
  - 1. Multileaf collimators.
  - 2. Tissue compensators.
  - 3. Percentage depth dose.
  - 4. Radioprotectors.
  - 5. <sup>99m</sup>Tc.
  - 6. p-value.
  - 7. Hyperthermia.
  - 8. Lymphatic drainage of tongue.
  - 9. Cancer Registry.
  - 10. BED (Biological Effective Dose).