April-2001

[KD 150] **Sub. Code : 2047**

M.D. DEGREE EXAMINATION.

(Revised Regulations)

Branch IX — Radiotherapy

Part II — Preliminary

MEDICINAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY

Time : Three hours Maximum : 100 marks

Answer ALL questions.

1. Enumerate the various factors that influence the percentage depth dose values of a radiation beam and describe them. What are isodose charts? Describe with the help of a diagram the 4 mV X-ray beam isodose chart. (25)

2. Describe the basic plan of a radiotherapy department that is required to provide radiotherapy facilities to manage about 3000 new cancer patients annually. (25)

3. Write short notes on : (5 × 10 = 50)

(a) The build up and its clinical implications

(b) The optimum energy for teletherapy you prefer at your centre

(c) Charged particles in radiotherapy

(d) After loading interstitial brachytherapy

(e) Remote control after loading low dose-rate techniques.

November-2001

[KE 150] **Sub. Code : 2047**

M.D. DEGREE EXAMINATION.

(Revised Regulations)

Branch IX — Radiotherapy

Part II — Preliminary

MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY

Time : Three hours Maximum : 100 marks

1. Explain how a linear accelerator works and compare it with a telecobalt unit. (25)

2. What are the different interactions of 'X' and 'gamma' radiations with matter? What is their significance in clinical radiotherapy? (25)

3 Write briefly on : (5 × 10 = 50)

(a) Radiation survey in a brachytherapy facility.

(b) High LET particles in Radiotherapy.

(c) Half value thickness.

(d) Central axis percentage depth dose.

(e) Lasers in radiotherapy.

March-2002

[KG 150] **Sub. Code : 2047**

M.D. DEGREE EXAMINATION

(Revised Regulations)

Branch IX — Radiotherapy

Part II — Preliminary

MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY

Time : Three hours Maximum : 100 marks

Answer ALL questions.

1. Describe the salient features of electron beam therapy. (25)

2. Draw a block diagram of a linear accelerator and explain briefly the functions of various components. (25)

3. Write short notes on : (5 × 10 = 50)

   (a) Isodose chart.

   (b) Intensity Modulated Radiotherapy (IMRT)

   (c) ALARA.

   (d) Biological effects of radiation.

   (e) O.E.R.

September-2002

[KH 150] Sub. Code : 2047

M.D. DEGREE EXAMINATION.

(Revised Regulations)

Branch IX — Radiotherapy

Part II — Preliminary

MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY

Time : Three hours Maximum : 100 marks

1. Explain the principle and construction of a High Energy Linear Accelerator used for clinical radiotherapy. (25)

2. Compare the physical parameters of cobalt–60 gamma rays, linear accelerator X ray photons lower energy and higher energies, and high energy electron beams. (25)

3 Write briefly on : (5 × 10 = 50)

(a) Endovascular brachytherapy

(b) Stereotactic radio surgery

(c) Simulator CT machines

(d) Late effects of ionising radiations

(e) Aluminium tissue compensators.

April-2003

[KI 150] **Sub. Code : 2047**

M.D. DEGREE EXAMINATION.

(Revised Regulations)

Branch IX — Radiotherapy

Part II — Preliminary

MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY

Time : Three hours Maximum : 100 marks

Answer ALL questions.

1. Define the quantities "EXPOSURE" and "ABSORBED DOSE" relating to X and gamma radiation beams. How you will measure the output of a linear accelerator? (25)

2. Write an essay on the production of artificial radioactive isotopes. What are the physical parameters of various radioactive isotopes used in clinical radiotherapy. (25)

3. Write briefly on : (5 × 10 = 50)

(a) Air Kerma rate at 1 metre

(b) High Dose Rate Remote Afterloading Brachytherapy

(c) TLD Personnel Monitoring Badge

(d) QA for Teletherapy machines

(e) Pi Mesons.

[KJ 150] **Sub. Code : 2047**

M.D. DEGREE EXAMINATION.

(Revised Regulations)

Branch IX — Radiotherapy

Part II — Preliminary

MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY

Time : Three hours. Maximum : 100 marks

Theory : Two hours and forty minutes Theory : 80 marks

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

M.C.Q. must be answered **SEPARATELY** on the Answer Sheet provided as per the instructions given on the first page of M.C.Q. Booklet.

Answer ALL questions.

Draw suitable diagrams wherever necessary.

Essay Questions : (2 × 15 = 30)

1. Discuss : Remote after loading and manual after loading.

2. Analyse : Role of different imaging modalities in treatment planning.

3. Short notes questions : (10 × 5 = 50)

(a) Stereotactic Radio–Surgery.

(b) Conformal Radiotherapy.

(c) Electron beam interaction with matter.

(d) Factors affecting Tissue–air ratio.

(e) Half–life and Half–value layer thickness.

(f) Co–60 decay scheme.

(g) Tissue inhomogeneities correction methods.

(h) Box technique.

(i) Radiation protection measures to be taken during brachytherapy.

(j) Moulds.

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KL 150] **Sub. Code : 2047**

M.D. DEGREE EXAMINATION.

(Revised Regulations)

Branch IX — Radiotherapy

Part II — Preliminary

MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY

Time : Three hours — Maximum : 100 marks

Theory : Two hours and forty minutes — Theory : 80 marks

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) Explain how Bremstralungh radiation is produced.

(2) What is a CT simulator? Explain how planning is performed with a CT Simulator.

II. Short notes : $(10 \times 5 = 50)$

(a) Define percentage depth dose (PDD) and explain the factors that affect the PDD.

(b) What is a virtual wedge (or Dynamic wedge)? Compare it with a physical wedge.

(c) Discuss the methods of applying corrections for tissue in homogeneties.

(d) Write a note on Secondary standard dosimeter.

(e) Explain Therapeutic Range, Practical range and 50% range of an electron beam with a diagram of an electron beam central axis depth dose curve.

(f) Discuss the Paris technique for interstitial implant.

(g) Define point A and point B in Intracavitary application and discuss the ICRU method of dose reporting and prescription for intra uterine application.

(h) Write a short note on the Electronic Portal imaging device (EPID).

(i) Discuss Equivalent dose and Effective dose.

(j) Describe Stochastic Effect and Deterministic effect.
