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B.R.T. THIRD YEAR EXAMINATION, JUNE/JULY - 2013
BRACHYTHERAPY
PAPER FIRST

[Time allotted: Three hours]

[Max Marks: 70]

Note: Attempt all questions

Draw suitable diagram wherever necessary

A : Short answer questions:

(7 x 9 = 63)

- Q. 1. Write short note on Iridium -192. Draw isodose curve intra cavitory brachytherapy in cancer cervix.
- Q. 2. Write short note on interstitial brachytherapy. Write down two examples of this.
- Q. 3. Write short note on Manchester system of brachytherapy.
- Q. 4. What is rationale of vaginal packing in treatment of cancer cervix by brachytherapy?
- Q. 5. What is brachytherapy? Write note on permanent radionuclides used in brachytherapy.
- Q. 6. What are advantages of remote afterloading units?
- Q. 7. Explain point A and point B in Ca cervix.
- Q. 8. Write short note on:
 - a. Activity
 - b. Kerma
- Q. 9. Write down physical characteristics of radionulides.

B.R.T. THIRD YEAR EXAMINATION, JUNE/JULY - 2013
BRACHYTHERAPY
PAPER FIRST (MCQ)

Time allotted for MCQ- 15 minutes

B : MCQs (Single response type):

(½ x 14= 7)

Select the most appropriate answer and encircle the alphabet against it

1. Half life of cobalt - 60 is:
 - a. 5 yrs.
 - b. 6 hrs.
 - c. 5.26 yrs.
 - d. 30 yrs.
2. Carcinoma skin can be treated by:
 - a. 15 mv photons
 - b. 10 mv photons
 - c. Surface molds
 - d. Intracavitary brachytherapy
3. In Manchester system, point A is ----- cm superior to lateral vaginal fornix.
 - a. 5
 - b. 1
 - c. 2
 - d. 0.5
4. Heyman capsule were used to treat cancer:
 - a. Stomach
 - b. Uterus
 - c. Skin
 - d. Orbit
5. In CVS applications number of applicators are:
 - a. 3
 - b. 1
 - c. 12
 - d. 2
6. Permanent implants are done with:
 - a. Ir-192
 - b. I-125
 - c. Cs-137
 - d. Co-60
7. Unit of specific activity is:
 - a. Ci/m
 - b. Ci/m²
 - c. Ci/micron
 - d. Ci/gm
8. Which of the following is ICRU reference points?
 - a. Bladder reference point
 - b. Rectum reference point
 - c. Both a & b
 - d. Stomach reference point
9. Bladder point is localized by using:
 - a. Foley's catheter
 - b. Tracheostomy
 - c. Colostomy
 - d. Ryle's tube
10. Everage energy of Ir- 192 isotope is:
 - a. 0.511 mev
 - b. 0.380 mev
 - c. 0.167 mev
 - d. 1.25 mev
11. What is the activity of the source when loaded in HDR, brachytherapy machine?
 - a. 5 Ci
 - b. 10 Ci
 - c. 7 Ci
 - d. 12 Ci
12. Dwell position is for:
 - a. Ovoids
 - b. Tendon
 - c. Source
 - d. Patient
13. Orthogonal imaging indicates:
 - a. Spectroscopy
 - b. Angiography
 - c. Radiographs
 - d. All of the above
14. The AAPM recommends QA tests for brachytherapy:
 - a. Daily
 - b. Quarterly
 - c. Annually
 - d. All of the above

B.R.T. THIRD YEAR EXAMINATION, JUNE/JULY - 2013
ADVANCED RADIOTHERAPY TECHNIQUES
PAPER TWO

[Time allotted: Three hours]

[Max Marks: 70]

Note: Attempt all questions

Draw suitable diagram wherever necessary

A : Short answer questions:

(7 x 9 = 63)

- Q. 1. Explain stereotactic radiotherapy and stereotactic radiosurgery in detail.
- Q. 2. What is charged particle therapy and how it differs from photon beam radiotherapy?
- Q. 3. What is intensity modulated radiation therapy and its advantage in case of head and neck cancer?
- Q. 4. Explain the importance of modern imaging techniques in radiotherapy.
- Q. 5. Write short notes on: (2+2+3=7)
a. VMAT
b. Rapid Arc
c. IGRT
- Q. 6. Write short notes on: (4+3=7)
a. Gamma knife
b. Tomotherapy
- Q. 7. Write short note on: (4+3=7)
a. Whole body irradiation
b. 3D- CRT
- Q. 8. Write short note on: (4+3=7)
a. EPID & DRR
b. Treatment planning system
- Q. 9. Explain following: (4+3=7)
a. 4D conformal radiation therapy
b. Beam modifying devices

B.R.T. THIRD YEAR EXAMINATION, JUNE/JULY - 2013
ADVANCED RADIOTHERAPY TECHNIQUES
PAPER TWO (MCQ)

Time allotted for MCQ- 15 minutes

B : MCQs (Single response type):

(½ x 14= 7)

Select the most appropriate answer and encircle the alphabet against it

1. Molecular imaging is associated with:
 - a. PET
 - b. CT
 - c. LINAC
 - d. None of the above
2. EPID of primus plus has ----- detectors:
 - a. 1000
 - b. 2000
 - c. 3000
 - d. 1024
3. Dose limit for trainee is:
 - a. 1 mδv
 - b. 6 mδv
 - c. 8 mδv
 - d. 20 mδv
4. Minimum PTV margin is given in:
 - a. Conventional RT
 - b. IGRT
 - c. VMAT
 - d. SRT
5. International guideline for IMRT is:
 - a. ICRU- 83
 - b. ICRU- 50
 - c. ICRU- 60
 - d. IAEA
6. The radiation source used in gamma knife is:
 - a. X- ray
 - b. Co-60
 - c. Proton
 - d. Neutron
7. Which is the latest machine from Varian?
 - a. Trilogy
 - b. True beam
 - c. Primy plus
 - d. Primus
8. Which one of the following is suitable for treatment with gamma knife?
 - a. AVM
 - b. Base of tongue
 - c. Ca lung
 - d. GBM
9. Electron is used for:
 - a. Boost for chest flaps
 - b. Leukemia
 - c. Head and neck cancer
 - d. Both a & c
10. SIB is given in:
 - a. IMRT
 - b. 3DCRT
 - c. ICRT
 - d. ILRT
11. Gamma knife consists of ----- sources.
 - a. 201
 - b. 202
 - c. 301
 - d. 302
12. In diagnostic X-ray ----- is dominant.
 - a. Photo electric effect
 - b. Pair production
 - c. Heel effect
 - d. Compton effect
13. PTV stands for:
 - a. Planning target volume
 - b. Planning tumor volume
 - c. Phase tumor volume
 - d. Phase treatment volume
14. Primus plus has ----- lasers.
 - a. 1
 - b. 4
 - c. 2
 - d. 3

B.R.T. THIRD YEAR EXAMINATION, JUNE/JULY - 2013
RADIATION SAFETY & QUALITY ASSURANCE
PAPER THREE

[Time allotted: Three hours]

[Max Marks: 70]

Note: Attempt all questions

Draw suitable diagram wherever necessary

A : Short answer questions:

(7 x 9 = 63)

- Q. 1. Write down the QA protocol of nuclear medicine procedures.
- Q. 2. What are safety measures to be taken for general public visiting radiotherapy department?
- Q. 3. Write down the QA protocol for IMRT.
- Q. 4. Write down safety and security of radiation sources.
- Q. 5. Write short note on gamma zone monitor.
- Q. 6. Write down the role of technicians in handling radiation emergencies.
- Q. 7. Write short note on TLD badge.
- Q. 8. Write note on Maze design in radiotherapy department.
- Q. 9. Write short note on:
 - a. Roentgen
 - b. Rad

(4+3=7)

B.R.T. THIRD YEAR EXAMINATION, JUNE/JULY - 2013
RADIATION SAFETY & QUALITY ASSURANCE
PAPER THREE (MCQ)

Time allotted for MCQ- 15 minutes

B : MCQs (Single response type):

(½ x 14= 7)

Select the most appropriate answer and encircle the alphabet against it

1. Colostomy shielding is done in cancer of :
 - a. Rectum
 - b. Tonsil
 - c. GBM
 - d. Larynx
2. Ascitus is fluid in:
 - a. Abdomen
 - b. Brain
 - c. Lung
 - d. All of the above
3. Chemoport is used to give:
 - a. Radiotherapy
 - b. Brachytherapy
 - c. Oxygen
 - d. Chemotherapy
4. RTOG grade 4 skin reaction is:
 - a. Erythema
 - b. Ulcer
 - c. Eczema
 - d. Pigmentation
5. Gamma zone monitor is used in:
 - a. Co-60
 - b. Linac
 - c. Both
 - d. None of the above
6. Radiation surgery meter used in X- rays is:
 - a. Ion chamber
 - b. GM counter
 - c. Both
 - d. None of the above
7. The annual dose limit per radiation worker is:
 - a. 20 msv
 - b. 50 msv
 - c. 10 msv
 - d. 40 msv
8. The annual dose limit for general public is:
 - a. 1 msv
 - b. 2 msv
 - c. 20 msv
 - d. 40 msv
9. Which is safer?
 - a. Electron
 - b. Photon
 - c. X- ray
 - d. Proton
10. 1 Gy equals:
 - a. 100 rad
 - b. 1 rad
 - c. 1/10 rad
 - d. 10 rad
11. RFA in radiotherapy is:
 - a. Radiation field analyzer
 - b. Radio frequency ablation
 - c. Ratio field analyzer
 - d. Radio field analyzer
12. Unit of effective dose is:
 - a. Gy
 - b. Sv
 - c. Both
 - d. A°
13. Dose limit for pregnant radiation worker is:
 - a. 1 msv
 - b. 2 msv
 - c. 20 msv
 - d. 10 msv
14. T- rod used in radiation emergency of :
 - a. LINAC
 - b. Brachytherapy
 - c. Cobalt- 60 teletherapy
 - d. Gamma knife

Regn. No.....

Paper Code: RT- 301...

B.R.T. THIRD YEAR EXAMINATION, JUNE/JULY - 2015
BRACHYTHERAPY & NUCLEAR MEDICINE
PAPER FIRST

[Time allotted: Three hours]

[Max Marks: 70]

Note: Attempt all questions

Draw suitable diagram wherever necessary

A : Short answer questions:

(7 x 9 = 63)

- Q. 1. Write note on interstitial brachytherapy. Give two examples with isodose diagram
- Q. 2. Write short note on point A in brachytherapy treatment of Carcinoma cervix
- Q. 3. Write notes on tandoms and ovoids used in Intracavitary brachytherapy.
- Q. 4. Write note on HDR brachytherapy.
- Q. 5. Write note on Technetium 99m bone scan done in nuclear medicine department
- Q. 6. What is iridium-192? What is advantage of iridium-192 over Cesium-137 in brachytherapy treatment?
- Q. 7. What are various permanent isotopes used in brachytherapy?
- Q. 8. Draw layout diagram of brachytherapy room. write note on ACRB
- Q. 9. Write note on Air Kerma

B.R.T. THIRD YEAR EXAMINATION, JUNE/JULY - 2015
BRACHYTHERAPY & NUCLEAR MEDICINE
PAPER FIRST (MCQ)

Time allotted for MCQ- 15 minutes

B : MCQs (Single response type):

(½ x 14= 7)

Select the most appropriate answer and encircle the alphabet against it

1. Half life of the cobalt – 60 is :
 - a. 74 days
 - b. 5.26 years
 - c. 60 days
 - d. 30 years
2. Which of the following timer cannot be treated by brachytherapy:
 - a. Ca Tongue
 - b. Ca Cervix
 - c. Ca Calon
 - d. Ca Skin
3. Permanent implants are done with:
 - a. Ir-192
 - b. I-125
 - c. Ra-226
 - d. Cs-137
4. Pear shaped isodose seen in brachytherapy of:
 - a. Ca Esophagus
 - b. Ca Lip
 - c. Ca Cervix
 - d. Ca Tongue
5. Dose with maximum dose rate is given in
 - a. HDR
 - b. MDR
 - c. LDR
 - d. PDR
6. Micro selection HRD V3 Contains
 - a. One source
 - b. Two sources
 - c. Twenty Four sources
 - d. Thirty sources
7. Most Commonly Utilized PET radiotracer is:
 - a. F-MISO
 - b. Choline
 - c. 18-FDG
 - d. FLT
8. Dose Specification point is CVS brachytherapy in cancer cervix
 - a. Point A
 - b. 5mm from applicator Surface
 - c. 2.0cm from applicator surface
 - d. Uterus wall
9. Surface mould is used in treatment of
 - a. Cancer esophagus
 - b. Cancer lung
 - c. Cancer skin
 - d. Cancer tongue
10. Mammosite procedure done in brachytherapy of:
 - a. Ca lung
 - b. Ca Cervix
 - c. Ca Breast
 - d. Ca Tongue
11. Interstitial brachytherapy is gain in cancer:
 - a. Esophagus
 - b. Rectum
 - c. Lip
 - d. Leukemia
12. Which of the following radiopharmaceutical used in pain palliation
 - a. Phosphorous 32
 - b. Semarium -153
 - c. Tc.99m
 - d. Both a & b
13. Seed unplants are used in carcinoma:
 - a. Esophagus
 - b. Colon
 - c. Osteosarcoma
 - d. Prostate
14. Which of the following is Primary Barrier in brachytherapy Room?
 - a. Floor
 - b. Ceiling
 - c. Walls
 - d. All of the above

Regn. No.....

Paper Code: RT- 302...

B.R.T. THIRD YEAR EXAMINATION, JUNE/JULY - 2015
ADVANCE RADIOTHERAPY TECHNIQUES
PAPER TWO

[Time allotted: Three hours]

[Max Marks: 70]

Note: Attempt all questions

Draw suitable diagram wherever necessary

A : Short answer questions:

(7 x 9 = 63)

- Q. 1. Describe IMRT & its advantages over conventional techniques while treating patients with Head & Neck cancer.
- Q. 2. Discuss salient features of UMAT in radiotherapy.
- Q. 3. Describe briefly EPIB and its application in radioactive therapy.
- Q. 4. Describe technique of total body irradiation in patients planned for Bone marrow transplantation.
- Q. 5. What is particle therapy & its application in present day radiotherapy?
- Q. 6. How will you treat patient with mycosis fungoides limited to skin with radiotherapy?
- Q. 7. Describe use of cyber knife in cancer treatment.
- Q. 8. Describe 3 DCRT techniques used in treatment of cancer cervix.
- Q. 9. Write note on :
 - a. Tomotherapy
 - b. Gamma knife

B.R.T. THIRD YEAR EXAMINATION, JUNE/JULY - 2015
ADVANCE RADIOTHERAPY TECHNIQUES
PAPER TWO (MCQ)

Time allotted for MCQ- 15 minutes

B : MCQs (Single response type):

(½ x 14= 7)

Select the most appropriate answer and encircle the alphabet against it

1. Radiation sources used in gamma knives is :
 - a. Cobalt 60
 - b. X-ray
 - c. CS-137
 - d. Ir-192
2. Molecular imaging is associated with:
 - a. PET
 - b. SPECT
 - c. CT
 - d. Doppler
3. Inventor of X-ray is :
 - a. Newton
 - b. Curie
 - c. Einstein
 - d. Roentgen
4. Maximal mean dose to parotid gland is:
 - a. 6Gy
 - b. 16 Gy
 - c. 26Gy
 - d. 36 Gy
5. Dose limit for pregnant radiation worker is:
 - a. 1 MSv
 - b. 2 MSv
 - c. 5MSV
 - d. 10 Msv
6. Electrons can be used to treat:
 - a. Retroperitoneal Tumors
 - b. Renal cell carcinoma
 - c. Brain Tumors
 - d. None of the above
7. Bragg phenomenon is seen in:
 - a. Electron
 - b. Neutron
 - c. Proton
 - d. None of the above
8. Maximum PTV margins are given is:
 - a. IGRT
 - b. IMRT
 - c. Conventional treatment
 - d. VMAT
9. Microwave uses:
 - a. Ionizing Radiation
 - b. Non ionizing radiation
 - c. Laser
 - d. None of above
10. Gamma Knives is used in treatment of :
 - a. Base of Tongue
 - b. Solitary brain metastasis
 - c. Ca- colon
 - d. Nasopharynx
11. Photoelectric effect has highest probability of interaction will:
 - a. K shell electrons
 - b. L shell electrons
 - c. M shell electrons
 - d. N shell electrons
12. SRS is used in Radiotherapy:
 - a. Single fraction
 - b. Two fraction
 - c. Multiple fraction
 - d. None of these
13. Arc therapy is used:
 - a. VMAT
 - b. IMAT
 - c. Rapid Arc
 - d. All of these
14. Irradiated blood is used in :
 - a. Premature. Babies
 - b. Patients to undergo allogenic bone marrow transplant
 - c. Patients to undergo autologous bone marrow transplant
 - d. All of these

Regn. No.....

Paper Code: RT- 303...

B.R.T. THIRD YEAR EXAMINATION, JUNE/JULY - 2015
RADIATION SAFETY & QUALITY ASSURANCE
PAPER THREE

[Time allotted: Three hours]

[Max Marks: 70]

Note: Attempt all questions

Draw suitable diagram wherever necessary

A : Short answer questions:

(7 x 9 = 63)

- Q. 1. Write a note on background radiations.
- Q. 2. Write a short note on ALARA.
- Q. 3. How will you do radiation protection survey in linear accelerator?
- Q. 4. What are the personal monitoring devices used in radiotherapy? Explain TLD in detail?.
- Q. 5. How will you handle fire emergency in radiotherapy department?
- Q. 6. Write a note on QA procedure done for brachytherapy equipment.
- Q. 7. Write a note on ICRU. Write down annual dose limits for general public and radiation worker.
- Q. 8. Write a note on construction of Linac room.
- Q. 9. Write a short note on various steps taken for rodents control in Linac room.

B.R.T. THIRD YEAR EXAMINATION, JUNE/JULY - 2015
RADIATION SAFETY & QUALITY ASSURANCE
PAPER THREE (MCQ)

Time allotted for MCQ- 15 minutes

B : MCQs (Single response type):

(½ x 14= 7)

Select the most appropriate answer and encircle the alphabet against it

1. Unit of effective dose is:
 - a. Gy
 - b. Sv
 - c. Joules
 - d. Kilos
2. The dose limit for pregnant women is :
 - a. 1msv
 - b. 1/20 th of ALI
 - c. 20msv
 - d. 40 msv
3. Lead aprons are used for protection against:
 - a. γ -rays
 - b. 6mv photons
 - c. Diagnostic X- rays
 - d. 15mr photons
4. Gamma Zone monitor is used in :
 - a. Co-60
 - b. LINAC
 - c. Both
 - d. PET-CT
5. The annual dose limit for radiation worker is:
 - a. 20 msv
 - b. 50 msv
 - c. 10msv
 - d. 40 msv
6. Which one is permanent record?
 - a. Flim Badge
 - b. TLD
 - c. GM counter
 - d. None of the above
7. 1 Gray equals to:
 - a. 100 rads
 - b. 10 rads
 - c. 1000 ergs/gm
 - d. 100 rems
8. TLD is used for:
 - a. Radiation worker
 - b. Kids
 - c. General Public
 - d. Pregnant women
9. Which is more safe
 - a. Electron
 - b. Photon
 - c. X-rays
 - d. Protons
10. Permanent sterility in male requires a single dose in excess of :
 - a. 2 Gy
 - b. 1 Gy
 - c. 6 Gy
 - d. 3 Gy
11. Sir wilhelm conrod Roentgen discovered
 - a. Radium
 - b. Radioactivity
 - c. X-rays
 - d. Cobalt-60
12. Entrance of Linear Accelerator room has:
 - a. Maze walls
 - b. Circular Walls
 - c. Straight Entrance
 - d. None of the above
13. Latest report of ICRP is:
 - a. 83
 - b. 103
 - c. 105
 - d. 91
14. Natural background radiation comes from:
 - a. Cosmic rays
 - b. Terrestrial radiation
 - c. In holed radioactivity
 - d. All of the above

Regn. No.....

Paper Code: RT- 301...

B.R.T. THIRD YEAR EXAMINATION, JUNE/JULY - 2016
BRACHYTHERAPY & NUCLEAR MEDICINE
PAPER FIRST

[Time allotted: Three hours]

[Max Marks: 70]

Note: Attempt all questions

Draw suitable diagram wherever necessary

A : Short answer questions:

(7 x 9 = 63)

- Q. 1. What is Brachytherapy? What are the various sources used in brachytherapy?
- Q. 2. Write short note on Kerma.
- Q. 3. Write note on Paris system in brachytherapy.
- Q. 4. Write note on Brachytherapy suit in radiotherapy department.
- Q. 5. Write note on Remote afterloading in intracavitary brachytherapy.
- Q. 6. Write note on Point A in Carcinoma Cervix.
- Q. 7. Write note on Uterine tandem in brachytherapy.
- Q. 8. Write note on intraluminal brachytherapy.
- Q. 9. What is the difference between isodose curves of external beam and internal beam radiotherapy?

B.R.T. THIRD YEAR EXAMINATION, JUNE/JULY - 2016
BRACHYTHERAPY & NUCLEAR MEDICINE
PAPER FIRST (MCQ)

Time allotted for MCQ- 15 minutes

B : MCQs (Single response type):

(½ x 14= 7)

Select the most appropriate answer and encircle the alphabet against it

1. What is the activity of the source when loaded in HDR Brachytherapy machine?
 - a. 5ci
 - b. 10ci
 - c. 7ci
 - d. 12ci
2. Which of the following is commonest used in interstitial brachytherapy?
 - a. Uranium
 - b. I-125
 - c. Ir-192
 - d. Electrons
3. Half life of the Ir-192 is:
 - a. 73.83 Days
 - b. 17 Days
 - c. 60 Days
 - d. 5.26 Yrs
4. Which of the following tumor cannot be treated by brachytherapy?
 - a. Ca Cx
 - b. Ca Brain
 - c. Ca Breast
 - d. Ca Colon
5. Dose rate in HDR Brachytherapy isGY/hr:
 - a. 12
 - b. 2
 - c. 6
 - d. 0.5
6. Dose specification point in Brachytherapy in Ca Cervix:
 - a. Point A
 - b. Point B
 - c. Rectum
 - d. Bladder
7. Micro selectron HDR V3 Contains:
 - a. One Source
 - b. Two Sources
 - c. Twenty Four Sources
 - d. Thirty Sources
8. Permanent seed implantation is done in carcinoma:
 - a. Cervix
 - b. Penis
 - c. Gall Bladder
 - d. Prostate
9. Dose with maximum dose rate is given in:
 - a. LDR
 - b. PDR
 - c. HDR
 - d. MDR
10. Gliosite waffer is given in:
 - a. GBM
 - b. Medulloblastoma
 - c. Craniopharyngioma
 - d. Hemangioma Brain
11. Permanent Implants are done with:
 - a. Ra - 226
 - b. Ir - 192
 - c. Cs - 137
 - d. I- 125
12. Interstitial Brachytherapy is done in all except:
 - a. Tongue
 - b. Lip
 - c. Cervix
 - d. Esophagus
13. Organ at risk in cancer cervix are all except ...:
 - a. Urinary bladder
 - b. Liver
 - c. Rectum
 - d. Sigmoid
14. In Carcinoma skin Radiotherapy is given by:
 - a. 6 MV XRay
 - b. 15 MV XRay
 - c. Cobalt 60
 - d. Surface Mould

Regn. No.....

Paper Code: RT- 302...

B.R.T. THIRD YEAR EXAMINATION, JUNE/JULY - 2016
ADVANCE RADIOTHERAPY TECHNIQUES
PAPER TWO

[Time allotted: Three hours]

[Max Marks: 70]

Note: Attempt all questions

Draw suitable diagram wherever necessary

A : Short answer questions:

(7 x 9 = 63)

Write short notes on:

- Q. 1. Adaptive Radiotherapy treatment planning.
- Q. 2. Intensity modulated radiation therapy delivery.
- Q. 3. Cone Beam CT in radiotherapy.
- Q. 4. Proton beam therapy.
- Q. 5. Gamma Knife.
- Q. 6. Electronic Portal Imaging Device.
- Q. 7. HIS (hospital information system) in your department.
- Q. 8. Dynamic MLC.
- Q. 9. PET based radiotherapy planning.

B.R.T. THIRD YEAR EXAMINATION, JUNE/JULY - 2016
ADVANCE RADIOTHERAPY TECHNIQUES
PAPER TWO (MCQ)

Time allotted for MCQ- 15 minutes

(½ x 14= 7)

B : MCQs (Single response type):

Select the most appropriate answer and encircle the alphabet against it

1. Parallel OAR in ICRU is all except ____ :
 - a. Urinary bladder
 - b. Kidney
 - c. Parotid
 - d. Spinal cord
2. Phantom is used in :
 - a. Stereotactic Surgery
 - b. Electron beam CT
 - c. Both
 - d. Mammography
3. The radiation source used in gamma knife is _____ :
 - a. Co-60
 - b. X-ray
 - c. Ir-192
 - d. None of these
4. Gamma Knife consists of _____ sources:
 - a. 201
 - b. 202
 - c. 206
 - d. None of these
5. Variation of target volume with motion includes _____ :
 - a. Internal Target Volume
 - b. Gross Target Volume
 - c. Clinical Target Volume
 - d. Organ at risk
6. MLC stands for _____ :
 - a. Multileaf collimator
 - b. Manyleaf collimator
 - c. Minileaf collimator
 - d. None of these
7. In IMRT to treat the patient with beams of _____ :
 - a. Uniform fluences
 - b. Nonuniform fluences
 - c. Both i & ii
 - d. None of these
8. How many leaves have MIMIC collimator in Tomotherapy?
 - a. 20 Leaves
 - b. 20 Leaves each banks
 - c. 30 Leaves
 - d. None of these
9. Internal Target Volume is :
 - a. GTV+IM
 - b. CTV+IM
 - c. PTV+IM
 - d. GTV+CTV
10. In Cone Beam CT Which algorithm used. :
 - a. Back Projection
 - b. Filtered back projection
 - c. Projection
 - d. None of these
11. Commonly number of beams used in IMRT technique :
 - a. 1
 - b. 2
 - c. 5
 - d. Any number
12. Proton charge is _____ :
 - a. Negative
 - b. Positive
 - c. Neutral
 - d. None of these
13. What site is suitable for gamma knife _____ ?
 - a. Ca colon
 - b. Ca Tongue
 - c. Ca cervix
 - d. Pituitary Tumor
14. Half life of Co60 _____ :
 - a. 5 years
 - b. 5.26 years
 - c. 10.12 years
 - d. 3years

Regn. No.....

Paper Code: RT- 303...

B.R.T. THIRD YEAR EXAMINATION, JUNE/JULY - 2016
RADIATION SAFETY & QUALITY ASSURANCE
PAPER THREE

[Time allotted: Three hours]

[Max Marks: 70]

Note: Attempt all questions
Draw suitable diagram wherever necessary

A : Short answer questions:

(7 x 9 = 63)

- Q. 1.** Write down the basic principles of radiation safety in detail.
- Q. 2.** What are the quality assurance protocols for radiation therapy?
- Q. 3.** Write down the role of technicians in handling radiation emergencies.
- Q. 4.** What are personal monitoring devices? Describe TLD in detail.
- Q. 5.** What are the QA tests to be performed for HDR Brachytherapy Units?
- Q. 6.** Describe ALARA and the radiation dose limits for various categories of radiation workers & general public.
- Q. 7.** Write short notes:
- a.** Film Badge (3)
 - b.** Construction of linac room (4)
- Q. 8.** Write Short Notes on:
- a.** Background radiation (3)
 - b.** Stochastic effect (4)
- Q. 9.** Write down the radiation safety measures to be taken during Brachytherapy treatment.

B.R.T. THIRD YEAR EXAMINATION, JUNE/JULY - 2016
RADIATION SAFETY & QUALITY ASSURANCE
PAPER THREE (MCQ)

Time allotted for MCQ- 15 minutes

B : MCQs (Single response type):

(½ x 14= 7)

Select the most appropriate answer and encircle the alphabet against it

1. The short form of international commission of radiological units & measurements is
 - a. ICRU
 - b. ICRUM
 - c. ICRP
 - d. ICRT
2. The annual dose limit for general public is
 - a. 1 mSv
 - b. 2 mSv
 - c. 20 mSv
 - d. 40 mSv
3. The annual dose limit for radiation worker is
 - a. 20 mSv
 - b. 50 mSv
 - c. 10 mSv
 - d. 40 mSv
4. RFA in radiotherapy is
 - a. Radio frequency Ablation
 - b. Radiation field Analyzer
 - c. Ratio field Analyzer
 - d. Radio field Analyzer
5. TLD is
 - a. Thermo Luminescent Dosimeter
 - b. Thermo Lucent Dosimeter
 - c. Trans- Luminescent Dosimeter
 - d. Trans- Lucent Dosimeter
6. TLD is used for
 - a. General Public
 - b. Radiation Worker
 - c. Kids
 - d. Pregnant women
7. The Dose Limit for Pregnant women is
 - a. 1mSv
 - b. 1/20th of ALI
 - c. 20 mSv
 - d. 40 mSv
8. Which one is permanent record?
 - a. Film Badge
 - b. TLD
 - c. Both
 - d. None of the above
9. Latest Recommendation for IMRT is
 - a. ICRU-83
 - b. ICRU-50
 - c. ICRU-62
 - d. ICRU-58
10. Well type chamber is used for QA of
 - a. HDR Brachytherapy
 - b. LDR Brachytherapy
 - c. Both of Above
 - d. None of the above
11. Radiation Survey meter used in X rays is
 - a. GM counter
 - b. Ion chamber
 - c. Both
 - d. None of the above
12. Gamma Zone monitor is used in
 - a. Co-60
 - b. Linac
 - c. Both
 - d. None of the above
13. Unit of Effective dose is
 - a. Gy
 - b. Sv
 - c. Roentgen
 - d. None of the above
14. Which is used to treat superficial tumors
 - a. Electron
 - b. Photon
 - c. X rays
 - d. Proton

**B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION
JUNE/JULY - 2017
BRACHYTHERAPY & NUCLEAR MEDICINE
PAPER FIRST**

[Time allotted: Three hours]

[Max Marks: 70]

Note: Attempt all questions

Draw suitable diagrams wherever necessary

A : Short answer questions:

(7 x 9 = 63)

- Q. 1. What is Brachytherapy? Explain different types in brief.
- Q. 2. What are the different types of radionuclide's used in radiotherapy? Write short note on Iridium-192 source.
- Q. 3. Define point A and point B in Ca Cervix with diagram and write down the importance of point A.
- Q. 4. Write short note on :
- a. Half life (3)
 - b. PDR (4)
- Q. 5. Explain in detail differences between HDR and LDR brachytherapy.
- Q. 6. Write down the QA tests for brachytherapy HDR unit.
- Q. 7. Write emergency procedure if source stuck in brachytherapy HDR Unit.
- Q. 8. What are the dosemetric systems used in interstitial brachytherapy? Explain them briefly.
- Q. 9. Describe ILRT and its use in oncology with two examples.

B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION
JUNE/JULY - 2017
BRACHYTHERAPY & NUCLEAR MEDICINE
PAPER FIRST (MCQ)

Time allotted for MCQ - 15 minutes

B : MCQs (Single response type):

($\frac{1}{2} \times 14 = 7$)

Select the most appropriate answer and **encircle** the alphabet against it

1. The activity of the source is:
 - a. Decay rate
 - b. Energy fluence
 - c. Specific activity
 - d. None of above
2. Which of the following is primary barrier in brachytherapy room?
 - a. Floor
 - b. Ceiling
 - c. Walls
 - d. All of above
3. Half life of the Au-198 is:
 - a. 17 days
 - b. 59 days
 - c. 2.7 days
 - d. 5.26 yrs
4. Which of the following tumor can be treated by brachytherapy?
 - a. Ca oesophagus
 - b. Bone tumor
 - c. Ca ovary
 - d. Ca colon
5. Morphine is:
 - a. Anti-diarrheal
 - b. Analgesic
 - c. Hormone
 - d. Chemotherapy
6. Dose specification point in CVS brachytherapy in Ca cervix:
 - a. Point A
 - b. 5 mm from applicator surface
 - c. 2.0 cm from applicator surface
 - d. Uterus wall
7. Micro Selectron HDR V3 contains:
 - a. 30 channel
 - b. 20 channel
 - c. 41 channel
 - d. Thirty sources
8. Organ preservation by radiotherapy is done in all **except**:
 - a. Ca breast
 - b. Ca penis
 - c. Ca gall bladder
 - d. Ca larynx
9. Dose with maximum dose rate is given in:
 - a. LDR
 - b. PDR
 - c. HDR
 - d. MDR
10. Craniospinal irradiation is given in:
 - a. GBM
 - b. Medulloblastoma
 - c. Craniopharyngioma
 - d. Hemangioma brain
11. Permanent implants are **not** done with:
 - a. Ra-226
 - b. Au-98
 - c. I-125
 - d. None of above
12. Interstitial brachytherapy is done in all **except**:
 - a. Tongue
 - b. Lip
 - c. Cervix
 - d. Esophagus
13. Organs at risk in cancer mid esophagus are all **except**:
 - a. Lung
 - b. Spinal cord
 - c. Heart
 - d. Parotid
14. Haemostatic radiotherapy is given by:
 - a. Conventional
 - b. Hypo fractionation
 - c. Hyper fractionation
 - d. Surface mould

**B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION, JUNE/JULY - 2017
ADVANCE RADIOTHERAPY TECHNIQUES**

[Time allotted: Three hours]

[Max Marks: 70]

Note: Attempt all questions

Draw suitable diagrams wherever necessary

A : Short answer questions:

(7 x 9 = 63)

Write short notes on:

- Q. 1. What are methods to tackle respiratory motion?
- Q. 2. Write note on FORWARD PLANNING.
- Q. 3. Describe the rationale & clinical applications of electron therapy.
- Q. 4. Write briefly on VMAT.
- Q. 5. Immobilization used for stereotactic radiosurgery.
- Q. 6. What are methods of treatment verification? Write short note on Cone Beam CT.
- Q. 7. What are the advantages and disadvantages seen in HDR and LDR in radiotherapy department?
- Q. 8. What is IGRT? Write in detail about immobilization, imaging and treatment delivery.
- Q. 9. Describe rationale and indications of proton beam therapy.

B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION, JUNE/JULY - 2017
ADVANCE RADIOTHERAPY TECHNIQUES
(MCQ)

Time allotted for MCQ - 15 minutes

B : MCQs (Single response type):

($\frac{1}{2} \times 14 = 7$)

Select the most appropriate answer and **encircle** the alphabet against it

1. Cyber knife consists of _____ sources:
 - a. 201
 - b. 202
 - c. 206
 - d. None of these
2. OAR in brain tumor is:
 - a. Heart
 - b. Parotid gland
 - c. Optic nerve
 - d. None
3. The radiation source used in cyber knife is:
 - a. Co-60
 - b. X-ray
 - c. Ir-192
 - d. None of these
4. In IMRT the patient is treated with beams of:
 - a. Uniform fluences
 - b. Nonuniform fluences
 - c. Both a & b
 - d. None of these
5. Most commonly utilized PET radiotracer is:
 - a. F-MISO
 - b. Choline
 - c. 18-FDG
 - d. FLT
6. International guideline for brachytherapy is :
 - a. ICRU-83
 - b. ICRU-50
 - c. ICRU-38
 - d. IAEA
7. Which of the following is used for measuring the absorbed dose?
 - a. Film dosimeter
 - b. TLD
 - c. Calorimetry
 - d. All of the above
8. Forward planning is done in:
 - a. IMRT
 - b. 3DCRT
 - c. 2D
 - d. None of these
9. IMPT is related to:
 - a. Neutron
 - b. Proton
 - c. Meson
 - d. Electron
10. PRV stands for:
 - a. Planning target volume
 - b. Planning Risk volume
 - c. Phase tumor volume
 - d. Phase treatment volume
11. SRS is a _____ radiation therapy:
 - a. Single fraction
 - b. Multiple fraction
 - c. Two fraction
 - d. None of these
12. The radiation source used in gamma knife is :
 - a. Co-60
 - b. X-ray
 - c. Ir-192
 - d. None of these
13. Hyperthermia is:
 - a. Heat therapy
 - b. Electron therapy
 - c. Both a & b
 - d. None of these
14. Proton is accelerated by:
 - a. Cyclotron
 - b. Synchrotron
 - c. Both a & b
 - d. None of these

Regn. No.....

Paper Code: BRT- 303...

**B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION, JUNE/JULY - 2017
RADIATION SAFETY & QUALITY ASSURANCE**

[Time allotted: Three hours]

[Max Marks: 70]

Note: Attempt all questions

Draw suitable diagrams wherever necessary

A : Short answer questions:

(7 x 9 = 63)

- Q. 1. Write note on the basic principles of radiation safety.
- Q. 2. What are the quality assurance protocols for CT simulator?
- Q. 3. Write down the role of technicians in handling radiation emergencies.
- Q. 4. How you will check the mechanical and radiation isocenter of the Linac?
- Q. 5. Write note on water phantom dosimetry.
- Q. 6. Write note on QA tests to be performed for Co60 unit.
- Q. 7. Describe the radiation dose limits for various categories of radiation workers & general public.
- Q. 8. Write short note on TLD badge.
- Q. 9. Write note on Equivalent Dose and its units.

B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION, JUNE/JULY - 2017
RADIATION SAFETY & QUALITY ASSURANCE
(MCQ)

Time allotted for MCQ - 15 minutes

B : MCQs (Single response type):

(½ x 14= 7)

Select the most appropriate answer and **encircle** the alphabet against it

1. Shielding against beta radiation may be complicated because:
 - a. Beta radiation usually cannot be completely absorbed
 - b. Deceleration of beta particles produces neutrons
 - c. Beta particles are scattered by shields
 - d. Deceleration of beta particles produces more penetrating x-rays
2. The annual dose limit for general public is:
 - a. 1 msv
 - b. 2 msv
 - c. 20 msv
 - d. 40 msv
3. The annual dose limit for radiation worker is:
 - a. 20 msv
 - b. 50 msv
 - c. 10 msv
 - d. 40 msv
4. TLD measures ionizing radiation exposure by measuring the intensity of visible light emitted when:
 - a. Crystal is heated
 - b. Crystal is melted
 - c. Crystal not used
 - d. Crystal is vaporized
5. The accelerating waveguide of medical linear accelerators is:
 - a. Evacuated glass envelope tube
 - b. Evacuated circular and hollow copper tube
 - c. Circular and hollow copper tube
 - d. SF6 gas-filled circular and hollow copper tube
6. TLD is used for:
 - a. Radiation worker
 - b. General public
 - c. Children
 - d. Pregnant women
7. The dose limit for pregnant women is:
 - a. 1 msv
 - b. 1/20th of ALI
 - c. 20 msv
 - d. 40 msv
8. Which of the following personal protective clothing should be removed first to reduce the potential for personal contamination?
 - a. Tape from pant legs and sleeves
 - b. Coverall / lab coats
 - c. Rubber boots
 - d. Outer layer of double gloves
9. Latest recommendation for IMRT is:
 - a. ICRU-83
 - b. ICRU-50
 - c. ICRU-62
 - d. ICRU-58
10. Well type chamber is used for QA of :
 - a. HDR brachytherapy
 - b. LDR brachytherapy
 - c. X-ray unit
 - d. LINAC
11. Radiation survey meter used in X rays is:
 - a. Ion chamber
 - b. GM counter
 - c. Both
 - d. None of the above
12. Gamma zone monitor is used in:
 - a. Co-60
 - b. Linac
 - c. Both
 - d. None of the above
13. Unit of effective dose is:
 - a. Gy
 - b. Sv
 - c. Rem
 - d. None of the above
14. What is the best recommended shielding for mixed beta and gamma emitters?
 - a. Lead
 - b. Concrete
 - c. Plexiglass with lead
 - d. Aluminium with lead