

Regn. No.....

Paper Code: BRT- 301...

B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION, JULY-2018
BRACHYTHERAPY & NUCLEAR MEDICINE
PAPER - I

[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? What are the types of brachytherapy? (7)
- Q. 2.** Write short notes on the following:
- a.** Air Kerma strength (3)
 - b.** Point A (4)
- Q. 3.** Write down short note on the following:
- a.** Quimby system (3)
 - b.** Paris system (4)
- Q. 4.** Explain the complete procedure of intracavitary brachytherapy for Ca Cervix. (7)
- Q. 5.** Write emergency procedure if source stuck in Brachytherapy HDR Unit. (7)
- Q. 6.** What are the properties of an ideal source? (7)
- Q. 7.** Write short note on intra luminal brachytherapy. (7)
- Q. 8.** Write briefly on PET SCAN. (7)
- Q. 9.** What is interstitial brachytherapy? Give clinical examples of its use. (7)

B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION, JULY-2018
BRACHYTHERAPY & NUCLEAR MEDICINE
PAPER - I (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 **not** a type of brachytherapy?
 - a. Intracavitary
 - b. Interstitial
 - c. Intraluminal
 - d. Intravenous
3. Half life of the Cesium is:
 - a. 73.83 Days
 - b. 17 Days
 - c. 60 Days
 - d. 30 Yrs
4. Which of the following tumor **cannot** be treated by brachytherapy?
 - a. Ca cervix
 - b. Ca brain
 - c. Ca breast
 - d. Ca colon
5. ILRT is used in:
 - a. Ca breast
 - b. Ca esophagus
 - c. Ca gall bladder
 - d. Ca larynx
6. Surface mould is used for?
 - a. Brain tumor
 - b. Skin cancer
 - c. Ca rectum
 - d. Ca bladder
7. Property of ideal source:
 - a. Stable daughter product
 - b. Easy to dispose
 - c. Cheap
 - d. All of the above
8. Permanent implants are not done with:
 - a. Ra-226
 - b. Au-198
 - c. I-125
 - d. None of the above
9. Interstitial brachytherapy is done in all **except**:
 - a. Tongue
 - b. Lip
 - c. Cervix
 - d. Esophagus
10. Craniospinal irradiation is given in:
 - a. GBM
 - b. Medulloblastoma
 - c. Craniopharyngioma
 - d. Hemangioma
11. Permanent implants are done with:
 - a. Ra-226
 - b. Ir-192
 - c. Cs-137
 - d. I-125
12. Which of the following is primary barrier in brachytherapy room?
 - a. Floor
 - b. Ceiling
 - c. Walls
 - d. All of the above
13. Mean energy of Iridium 192 is:
 - a. 0.38 MeV
 - b. 1 MeV
 - c. 0.8 MeV
 - d. None of the above
14. Which ICRU is used in brachytherapy?
 - a. 38
 - b. 100
 - c. 50
 - d. None

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Paper Code: BRT-302...

**B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION, JULY - 2018
ADVANCE RADIOTHERAPY TECHNIQUES
PAPER - II**

[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 the advantages and disadvantages of IMRT?
- Q. 2.** Write note on 'inverse planning'.
- Q. 3.** Describe the rationale & clinical applications of tomotherapy.
- Q. 4.** Comparison of X-knife & gamma knife.
- Q. 5.** Discuss proton therapy. What machines are used in proton therapy?
- Q. 6.** Define stereotactic radiosurgery and stereotactic radiotherapy.
- Q. 7.** What are the advantages and disadvantages seen in HDR and LDR in the Radiotherapy Department?
- Q. 8.** What is IGRT? Write in detail about immobilization, imaging and treatment delivery.
- Q. 9.** Describe indications and techniques used in electron beam therapy.

B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION, JULY - 2018
ADVANCE RADIOTHERAPY TECHNIQUES
PAPER - II (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. Present International guideline for dosimetry is:
 - a. TRS-398
 - b. ICRU-50
 - c. ICRU-62
 - d. TRS-277
2. OAR in breast cancer 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. HDR unit consists of _____ sources.
 - a. 1
 - b. 2
 - c. 3
 - d. None of these
5. Dose limit for trainee is:
 - a. 1 msv
 - b. 20 msv
 - c. 6 msv
 - d. 5 msv
6. TSEI is used in:
 - a. Retinoblastoma
 - b. Mycosis fungoides
 - c. Leukemia
 - d. None of these
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. Inverse 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. In Cone Beam CT which algorithm is used?
 - a. Back projection
 - b. Filtered back projection
 - c. Projection
 - d. None of these
11. SRT is a _____ radiation therapy.
 - a. Single fraction
 - b. Multiple fraction
 - c. Two fraction
 - d. None of these
12. Proton charge is:
 - a. Negative
 - b. Positive
 - c. Neutral
 - 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

**B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION, JULY - 2018
RADIATION SAFETY & QUALITY ASSURANCE
PAPER - III**

[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 Co 60 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, JULY - 2018
RADIATION SAFETY & QUALITY ASSURANCE
PAPER - III (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 beta radiation usually cannot be completely absorbed, because:
 - a. Deceleration of beta particles
 - b. Particles produce 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 :
 - a. Crystal is heated
 - b. Crystal is melted
 - c. Crystal not used
 - d. None of the above
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. Kids
 - 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 a and b
 - 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

B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION, JULY - 2019
BRACHYTHERAPY & NUCLEAR MEDICINE
PAPER - I

[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 Inverse Square Law and its applications in brachytherapy?
- Q. 2. Write short notes on:
- a. Manchester system (4)
 - b. Paris system (3)
- Q. 3. What radioactive sources can be used in brachytherapy?
- Q. 4. Write short notes on:
- a. PDR brachytherapy (4)
 - b. LDR brachytherapy (3)
- Q. 5. Explain Point A in Ca Cervix and write down its limitations. Write a short note on Point B.
- Q. 6. Write briefly on emergency in brachytherapy and its management.
- Q. 7. What is the Manchester system for brachytherapy intracavitary implant?
- Q. 8. Write short notes on:
- a. Intra operative radiotherapy (4)
 - b. Gamma zone monitor (3)
- Q. 9. What is the difference between external beam and internal beam radiotherapy? Explain with isodose curves.

B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION, JULY - 2019
BRACHYTHERAPY & NUCLEAR MEDICINE
PAPER - I (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. 5 ci
 - b. 10 ci
 - c. 7 ci
 - d. 12 ci
2. Iridium 192 has:
 - a. Photons
 - b. Neutrons
 - c. Gamma rays
 - d. Electrons
3. Organ at risk in brachytherapy of cancer cervix:
 - a. Bladder
 - b. Rectum
 - c. Sigmoid colon
 - d. All of the above
4. Interstitial brachytherapy is done in all **except**:
 - a. Tongue
 - b. Lip
 - c. Cervix
 - d. Esophagus
- Dose with maximum dose rate is given in:
 - a. LDR
 - b. PDR
 - c. HDR
 - d. MDR
6. Which of the following tumor can be treated by brachytherapy?
 - a. Ca Breast
 - b. Ca Cervix
 - c. Ca Lung
 - d. All of the above
7. LDR is:
 - a. Low dose rate
 - b. Large dose rate
 - c. Load dose ratio
 - d. None
8. For which source more lead thickness is required for shielding:
 - a. Co-60
 - b. Cs-137
 - c. Au-198
 - d. Ir-192
9. Which of the following sources can be used in brachytherapy?
 - a. Cobalt
 - b. Iridium
 - c. Californium
 - d. All of the above
10. Dose rate for LDR brachytherapy:
 - a. 0.4-2 Gy/hr
 - b. 2-12 Gy/hr
 - c. >12 Gy/hr
 - d. None of the above
11. ILRT is used in:
 - a. Cervix
 - b. Esophagus
 - c. Lung
 - d. Brain
12. Half life of the Ir-192 is:
 - a. 73.83 days
 - b. 17 days
 - c. 60 days
 - d. 5.26 yrs
13. Longest half life is seen in which of the following:
 - a. Ra - 226
 - b. Ir - 192
 - c. Cs - 137
 - d. I - 125
14. Which of the following has emission of neutrons?
 - a. Cobalt
 - b. Iridium
 - c. Californium
 - d. None of the above

B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION, JULY - 2019
ADVANCE RADIOTHERAPY TECHNIQUES
PAPER - II

[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. Explain cyber knife along with its applications in management of cancer.

Q. 2. Write note on image guided radiotherapy.

Q. 3. Explain the treatment planning techniques in TBI.

Q. 4. What is charged particle therapy? Explain one charged particle beam therapy.

Q. 5. What is IMRT and its advantage in case of H&N cancer?

Q. 6. What are the treatment planning process in 3D CRT?

Q. 7. Write short notes on:

a. DVH

(4)

b. Image registration

(3)

Q. 8. Write short notes on:

a. Multileaf collimator

(3)

b. Mammosite

(4)

Q. 9. Explain following:

a. Gamma knife

(4)

b. Tomotherapy

(3)

B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION, JULY - 2019
ADVANCE RADIOTHERAPY TECHNIQUES
PAPER – II (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. Present International guideline for dosimetry is:
 - a. TRS-398
 - b. ICRU-50
 - c. ICRU-62
 - d. TRS-277
2. OAR in brain is:
 - a. Spinal cord
 - b. Eye lens
 - c. Optic nerve
 - d. b & c both
3. The radiation source used in gamma knife is:
 - a. Co-60
 - b. X-ray
 - c. Ir-192
 - d. None of these
4. HDR unit consists of _____ source(s).
 - a. 1
 - b. 2
 - c. 3
 - d. None of these
5. Dose limit for trainee is:
 - a. 1 msv
 - b. 20 msv
 - c. 6 msv
 - d. 5 msv
6. TBI is used in:
 - a. Retinoblastoma
 - b. Mycosis fungoides
 - c. Leukemia
 - d. None of these
7. In IMRT to treat the patient with beams of:
 - a. Uniform fluences
 - b. Non uniform fluences
 - c. Both a & b
 - d. None of the above
8. How many leaves have mimic collimator in Tomotherapy?
 - a. 20 leaves
 - b. 20 leaves each banks
 - c. 30 leaves
 - d. None of the above
9. Planning target value is:
 - a. GTV + IM
 - b. CTV + IM
 - c. PTV + IM
 - d. GTV + CTV
10. In Cone beam CT which algorithm is used:
 - a. Back projection
 - b. Filtered back projection
 - c. Projection
 - d. None of these
11. SRS is a _____ radiation therapy.
 - a. Single fraction
 - b. Multiple fraction
 - c. Two fraction
 - d. None of these
12. Proton charge is:
 - a. Negative
 - b. Positive
 - c. Neutral
 - d. None of these
13. Charged particle therapy:
 - a. Proton
 - b. Electron
 - c. Both a & b
 - d. None of the above
14. Proton is accelerated by:
 - a. Cyclotron
 - b. Synchrotron
 - c. Both a & b
 - d. None of the above

Regn. No.....

Paper Code: BRT 303

B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION, JULY - 2019
RADIATION SAFETY & QUALITY ASSURANCE
PAPER - III

[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 a short note on ALARA principle.
- Q. 2.** What are the quality assurance protocols for radiation therapy?
- Q. 3.** How to check the mechanical and radiation isocenter of the Linac? Explain in detail.
- Q. 4.** Describe personal monitoring device in detail.
- Q. 5.** What are the QA tests to be performed Linac units?
- Q. 6.** Describe the ICRP dose limits.
- Q. 7.** Write short notes:
- a. Pocket dosimetry
 - b. Construction of linac room
- Q. 8.** Write short notes on:
- a. Effective dose and its units
 - b. Deterministic and stochastic effect
- Q. 9.** Write down the critical role of radiation therapist in handling radiation emergencies.

B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION, JULY - 2019
RADIATION SAFETY & QUALITY ASSURANCE
PAPER - III (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. Simulators are primarily used to:
 - a. Localize the target
 - b. Duplicate the geometry of therapy machine
 - c. Duplicate the mechanical movements of therapy machine
 - d. All of the above
2. 1 Gy is the same as:
 - a. 1 rad
 - b. 10 cgy
 - c. 100 cgy
 - d. 1 erg
3. A HVL is a way of expressing:
 - a. A filtration of beam
 - b. Dose
 - c. Shielding
 - d. None of the above
4. Positron are produced during:
 - a. Compton effect
 - b. Photoelectric effect
 - c. Pair production
 - d. Coherent scattering
5. Photons are:
 - a. Negatively charged
 - b. Positively charged
 - c. Neutral
 - d. None of the above
6. The maximum dose from a single 6MV photon beam occurs at approximately:
 - a. 1.5 cm
 - b. 2 cm
 - c. 5 cm
 - d. 3 cm
7. CT simulator is different from a diagnostic CT scan because of:
 - a. Small bore
 - b. Flat couch
 - c. Quality of imaging
 - d. None of the above
8. 1 mev equals to:
 - a. 10^{-6} electron volts (ev)
 - b. 0^6 ev
 - c. 0^{10} ev
 - d. 10^{-9} ev
9. Bolus should be placed:
 - a. At skin surface
 - b. At some distance of skin surface
 - c. Both a and b
 - d. None of the above
10. Dose limit for cataract is:
 - a. 6 gy
 - b. 2 gy
 - c. 12 gy
 - d. 30 gy
11. SSD of Co-60 is:
 - a. 100 cm
 - b. 80 cm
 - c. 5 cm
 - d. 30 cm
12. Factors that increase the penumbra:
 - a. Increase in SSD
 - b. Increase in source diameter
 - c. Decrease in SDD (SCD)
 - d. All of the above
13. Which of the following elements is **not** included in the formation of Cerrobend?
 - a. Lead
 - b. Bismuth
 - c. Zinc
 - d. Tungsten
14. Gamma zone monitor is used in:
 - a. Co-60
 - b. Linac
 - c. Both
 - d. None of the above

Regn. No.....

Paper Code: BRT301

B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION, NOVEMBER - 2019
BRACHYTHERAPY & NUCLEAR MEDICINE
PAPER - I

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[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 notes on all of the following:

- Q. 1. Iridium 192 radioactive source
- Q. 2. Kerma
- Q. 3. Paris system in brachytherapy
- Q. 4. Brachytherapy suit in radiotherapy department
- Q. 5. Remote afterloading in intra-cavitary brachytherapy
- Q. 6. Point A in carcinoma cervix
- Q. 7. Uterine tandem in brachytherapy
- Q. 8. Intraluminal brachytherapy
- Q. 9. Difference between external beam and internal beam radiotherapy

Regn. No.....

Paper Code: BRT301

B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION, NOVEMBER - 2019
BRACHYTHERAPY & NUCLEAR MEDICINE
PAPER - I (MCQ)

Time allotted for MCQ - 15 minutes

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

B : MCQs (Single response type):

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

1. In carcinoma skin radiotherapy is given by:
 - a. 6 MV x-ray
 - b. 15 MV x-ray
 - c. Cobalt 60
 - d. Surface mould
2. Microselectron HDR V3 contains:
 - a. One source
 - b. Two sources
 - c. Twenty four sources
 - d. Thirty sources
3. Half life of the Ir - 192 is:
 - a. 73.83 Days
 - b. 17 Days
 - c. 60 Days
 - d. 5.26 Years
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. Which of the following is commonest used in interstitial brachytherapy?
 - a. uranium
 - b. I - 125
 - c. Ir - 192
 - d. Electrons
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. Au-198
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. 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

Regn. No.....

Paper Code: BRT302

**B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION, NOVEMBER - 2019
ADVANCE RADIOTHERAPY TECHNIQUES
PAPER - II**

[Time allotted: Three hours]

[Max Marks: 70]

Note: Attempt all questions

Draw suitable diagrams wherever necessary

A : Short answer questions:

(7 x 9 = 63)

W

Write notes on:

- Q. 1. IGRT
- 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

Regn. No.....

Paper Code: BRT 302

B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION, NOVEMBER - 2019
ADVANCE RADIOTHERAPY TECHNIQUES
PAPER - II
(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. Half life of Co60:
 - a. 5 years
 - b. 5.26 years
 - c. 10.12 years
 - d. 3 years
2. Phantom is used in:
 - a. Stereotactic surgery
 - b. Electron beam CT
 - c. Both a and b
 - d. Mammography
3. The radiation source used in gamma knife is:
 - a. Co-60
 - b. X-ray
 - c. Ir-192
 - d. None of the above
4. Gamma knife consists of sources.
 - a. 201
 - b. 202
 - c. 206
 - d. None of the above
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. Multi leaf collimator
 - b. Many leaf collimator
 - c. Mini leaf callimator
 - d. None of the above
7. IMRT is used to treat the patient with beams of:
 - a. Uniform fluences
 - b. Non-uniform fluences
 - c. Both a and b above
 - d. None of the above
8. How many leaves have collimator in tomotherapy?
 - a. 20 Leaves
 - b. 20 Leaves each banks
 - c. 64 Binary leaves
 - d. None of the above
9. Internal target volume is:
 - a. GTV + IM
 - b. CTV + IM
 - c. PTV + IM
 - d. GTV + CTV
10. Cone beam CT is used in:
 - a. IGRT
 - b. Mammography
 - c. Angiography
 - d. Spectroscopy
11. Commonly..... number of beams are 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 the above
13. Which site is suitable for gamma knife?
 - a. Ca colon
 - b. Ca tongue
 - c. Ca cervix
 - d. Pituitary tumor
14. Parallel OAR in ICRU is all **except**:
 - a. Urinary bladder
 - b. Kidney
 - c. Parotid
 - d. Spinal cord

B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION, NOVEMBER - 2019
RADIATION SAFETY & QUALITY ASSURANCE
PAPER - III

[Time allotted: Three hours]

[Max Marks: 70]

Note: Attempt all questions
Draw suitable diagrams wherever necessary

(7 x 9 = 63)

A : Short answer questions:

- 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.** Draw the layout of HDR brachytherapy facility and explain the significance of Gamma Zone Monitor
- Q. 4.** Describe TLD in detail
- Q. 5.** Write down the QA protocol for Brachytherapy
- Q. 6.** Describe the radiation dose limits for various categories of radiation workers & general public
- Q. 7.** Write short notes:
- a.** Film Badge (3)
 - b.** Compare the maze wall construction and Area Zone Monitor position in Co-60 and LINAC high energy. (4)
- Q. 8.** Write Short Notes on:
- a.** Background radiation (3)
 - b.** Emergency procedure in Co-60 (4)
- Q. 9.** What are the instruments used for survey in radiotherapy facilities? Draw the diagram of LINAC room and mark the survey positions in the layout.

B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION, NOVEMBER – 2019
RADIATION SAFETY & QUALITY ASSURANCE
PAPER - III
(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 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 is used in radiotherapy for:
 - a. PDD
 - b. Field symmetry
 - c. Radiation field
 - d. All of the above
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. Radiation worker
 - b. General public
 - c. Kids
 - d. Pregnant women
7. The dose limit for pregnant women is:
 - a. 1msv
 - b. $1/20^{\text{th}}$ of ALI
 - c. 20 msv
 - d. 40 msv
8. Latest report of ICRP is:
 - a. 83
 - b. 103
 - c. 105
 - d. 91
9. Which of the following is a rate measuring instrument:
 - a. Survey meter
 - b. Audible alarm
 - c. Area monitor
 - d. Both a & c
10. Well type chamber is used for QA of:
 - a. HDR brachytherapy
 - b. DR brachytherapy
 - c. Both of the above
 - d. None of the above
11. Radiation survey meter used in X rays is:
 - a. Ion chamber
 - b. GM counter
 - c. Both a and b
 - 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. Both
 - d. None of the above
14. ALARA stands for:
 - a. As low as responsibly acceptable
 - b. Alarm loss activated radiation activated
 - c. As low as reasonable achievable
 - d. As low as reasonably attenuated

**B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION, AUGUST - 2020
BRACHYTHERAPY & NUCLEAR MEDICINE
PAPER - I**

[Time allotted: Two hours]

[Max Marks: 70]

Note: Attempt all questions

Draw suitable diagrams wherever necessary

A : Short answer questions:

(10 x 06 = 60)

- Q. 1.** What is Brachytherapy? What are the sources used in brachytherapy and write down their properties.
- Q. 2.** Write briefly about Image Guided Brachytherapy.
- Q. 3.** What is Inverse Square Law? Explain its application in brachytherapy.
- Q. 4.** Write short notes on:
 - a.** Activity
 - b.** Paris System
- Q. 5.** Write in brief about the procedure of intracavitary brachytherapy.
- Q. 6.** What is Dose Rate? What are the different types of brachytherapy in terms of dose rate?

B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION, AUGUST - 2020
BRACHYTHERAPY & NUCLEAR MEDICINE
PAPER - I (MCQ)

Time allotted for MCQ - 15 minutes

B : MCQs (Single response type):

(01 x 10 = 10)

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. ILRT is used in:
 - a. Lung
 - b. Brain
 - c. Breast
 - d. Cervix
3. Microselectron HDR V3 contains:
 - a. One source
 - b. Two sources
 - c. Twenty four sources
 - d. Thirty sources
4. Interstitial brachytherapy is done in all except:
 - a. Tongue
 - b. Lip
 - c. Cervix
 - d. Esophagus
5. Dose specification point in brachytherapy in Ca cervix:
 - a. Point A
 - b. Point B
 - c. Rectum
 - d. Bladder
6. Which of the following tumor **cannot** be treated by brachytherapy?
 - a. Ca cervix
 - b. Ca brain
 - c. Ca breast
 - d. Ca colon
7. PDR is:
 - a. Planning Dose Rate
 - b. Pulse Dose Rate
 - c. Pulse Dose Ratio
 - d. None of the above
8. Half life of cobalt 60 is:
 - a. 2 days
 - b. 74 days
 - c. 5.26 years
 - d. 30 years
9. Which of the following sources can be used in brachytherapy?
 - a. Cobalt
 - b. Iridium
 - c. Cesium
 - d. All of the above
10. Dose rate for HDR brachytherapy:
 - a. 0.4 - 2 Gy/hr
 - b. 2 - 12 Gy/hr
 - c. >12 Gy/hr
 - d. None of the above

Regn. No. DD.....

Paper Code: BRT302

B.SC. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION, AUGUST - 2020
ADVANCE RADIOTHERAPY TECHNIQUES
PAPER - II

[Time allotted: Two hours]

[Max Marks: 70]

Note: Attempt all questions

Draw suitable diagrams wherever necessary

A : Short answer questions:

(10 x 06 = 60)

Write short notes on:

Q. 1. Rapid Arc Therapy

Q. 2. Alpha Cadle in radiotherapy

Q. 3. Proton beam therapy

Q. 4. Gamma Knife

Q. 5. Electronic Portal Imaging Device

Q. 6. HIS (hospital information system) in your department

B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION, AUGUST - 2020
ADVANCE RADIOTHERAPY TECHNIQUES
PAPER – II (MCQ)

Time allotted for MCQ - 15 minutes

B : MCQs (Single response type):

(01 x 10= 10)

10

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

1. Alpha cradle is used for _____ in radiotherapy.
 - a. Immobilization
 - b. Beam direction
 - c. As a compensator
 - d. Bolus
2. Phantom is used in:
 - a. Stereotactic surgery
 - b. Electron beam CT
 - c. Both of the above
 - d. Mammography
3. The radiation source used in gamma knife is:
 - a. Co-60
 - b. X-ray
 - c. Ir-192
 - d. None of the above
4. Gamma knife consists of _____ sources.
 - a. 201
 - b. 202
 - c. 206
 - d. None of the above
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 callimator
 - d. None of the above
7. In IMRT the patient is treated with beams of:
 - a. Uniform fluences
 - b. Nonuniform fluences
 - c. Both a & b above
 - d. None of the above
8. How many leaves have mimic collimator in tomotherapy?
 - a. 20 leaves
 - b. 20 leaves each banks
 - c. 64 binary leaves
 - d. None of the above
9. Internal target volume is:
 - a. GTV + IM
 - b. CTV + IM
 - c. PTV + IM
 - d. GTV + CTV
10. Algorithm used in CT simulator:
 - a. Filtration
 - b. Filtered back projection
 - c. Projection
 - d. None of the above

Regn. No. DD.....

Paper Code: BRT303

B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION, AUGUST - 2020
RADIATION SAFETY & QUALITY ASSURANCE
PAPER - III

[Time allotted: Two hours]

[Max Marks: 70]

Note: Attempt all questions

Draw suitable diagrams wherever necessary

A : Short answer questions:

(10 x 06 = 60)

- Q. 1.** Write down the basic principles of radiation safety in detail.
- Q. 2.** What are the quality assurance tests for Cobalt 60 and Linac units?
- Q. 3.** Draw the layout of HDR brachytherapy facility and explain the significance of Gamma Zone Monitor.
- Q. 4.** Describe personal monitoring devices in detail.
- Q. 5.** How will you manage emergency of a stuck source during treatment in HDR brachytherapy?
- Q. 6.** Describe the radiation dose limits for various categories of radiation workers & general public.

Regn. No. DD.....

Paper Code: BRT303

B.Sc. MEDICAL TECHNOLOGY (RADIOTHERAPY)
THIRD YEAR EXAMINATION, AUGUST - 2020
RADIATION SAFETY & QUALITY ASSURANCE
PAPER - III
(MCQ)

Time allotted for MCQ - 15 minutes

B : MCQs (Single response type):

(01 x 10 = 10)

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

1. The short form of national council on radiation protection & measurements is:
 - a. NCRU
 - b. NCRUM
 - c. NCRP
 - d. NCRT
2. All are principles of radiation protection **except**:
 - a. Time
 - b. Dose
 - c. Distance
 - d. Shielding
3. The annual dose limit for radiation worker is:
 - a. 20 msv
 - b. 50 msv
 - c. 10 msv
 - d. 40 msv
4. RFA is used in radiotherapy for:
 - a. PDD
 - b. Field symmetry
 - c. Radiation field
 - d. All of the above
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. Radiation worker
 - b. General public
 - c. Kids
 - d. Pregnant women
7. The dose limit for pregnant women is:
 - a. 1msv
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8. Latest report of ICRP is:
 - a. 83
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 - c. 105
 - d. 91
9. Which of the following is a rate measuring instrument?
 - a. Survey meter
 - b. Audible alarm
 - c. Area monitor
 - d. Both a & b
10. Well type chamber is used for QA of:
 - a. HDR brachytherapy
 - b. LDR brachytherapy
 - c. Both a & b as above
 - d. None of the above