

[LB 0212]

AUGUST 2012

Sub. Code: 2112

B.Sc. NUCLEAR MEDICINE TECHNOLOGY

SECOND YEAR

PAPER II – RADIOCHEMISTRY AND RADIOPHARMACY

Q.P. Code : 802112

Time : Three hours

Maximum : 100 marks

(180 Mins) Answer ALL questions in the same order.

I. Elaborate on:

Pages Time Marks
(Max.)(Max.)(Max.)

- | | | | |
|--|---|----|----|
| 1. Explain the various processes involved in the 'Production of Radionuclides'. | 7 | 20 | 10 |
| 2. Dry generator system with diagram explaining its concept. | 7 | 20 | 10 |
| 3. Behavior of Radioactive tracers in the body with a note on Physical & Biological half life. | 7 | 20 | 10 |

II. Write Notes on:

- | | | | |
|--|---|----|---|
| 1. Atomic & Molecular structure. | 4 | 10 | 5 |
| 2. Logistics of Receipt & Storage of Radioactive materials. | 4 | 10 | 5 |
| 3. Ideal characteristics of Radiopharmaceuticals. | 4 | 10 | 5 |
| 4. Define the following terms-Atomic Number, Mass Number and give appropriate examples. | 4 | 10 | 5 |
| 5. Parent –Daughter relationship of radionuclide with example. | 4 | 10 | 5 |
| 6. Procedure for Hepatobiliary (Bulida) Scan including patient preparation. | 4 | 10 | 5 |
| 7. What is 'Radionuclide purity' and name the undesired radionuclide in Tc99m? | 4 | 10 | 5 |
| 8. Fate of Radiopharmaceuticals in the body. What is the target organ in a 'Hepatobiliary Scan'? | 4 | 10 | 5 |

III. Short Answers on:

- | | | | |
|---|---|---|---|
| 1. Name the various types of Bonding. | 2 | 4 | 3 |
| 2. Preparation of TC99m-RBC and where is it used. | 2 | 4 | 3 |
| 3. Name the two 'Solvent' systems used in Tc99m Radiopharmaceuticals. | 2 | 4 | 3 |
| 4. Preparation of TC99m-Sulfur Colloid and where is it used. | 2 | 4 | 3 |
| 5. What is meant by 'Antigen-Antibody' reaction? | 2 | 4 | 3 |
| 6. Define Labeling efficiency and how is it determined. | 2 | 4 | 3 |
| 7. What is 'Pyrogenicity' and the methods used for its testing? | 2 | 4 | 3 |
| 8. Mo99 contamination check. | 2 | 4 | 3 |
| 9. Radioactive symbol | 2 | 4 | 3 |
| 10. Define Acids & Bases. | 2 | 4 | 3 |

[LD 0212]

AUGUST 2013

Sub.Code :2112

**B.SC. NUCLEAR MEDICINE TECHNOLOGY
SECOND YEAR
PAPER – II RADIOCHEMISTRY & RADIO PHARMACY**

Q.P. Code: 802112

Time: Three hours

Maximum: 100 Marks

Answer All questions

I. Elaborate on:

(3 X 10 = 30)

1. Discuss the different radiopharmaceutical used for hepato biliary and reticuloendotelial imaging lo liver.
2. Describe the different mechanisms of localization of radiopharmaceutical in a given organ.
3. Define radiochemical purity of a radiopharmaceutical. Describe various methods of determining the radiopharmaceutical purity

II. Write Notes on:

(8 X 5 = 40)

1. State the oxidation states of Tc99m in a.Tc99m DTPa,Tc99m albumin and Tc99m HIDA
2. What is the compound for myocardial infarct imaging? Mention the time of imaging after injection and the dose used.
3. How do you perform Meckels diverticulum imaging?
4. What is the common radiopharmaceutical used for lymphoscintigraphy? What are the common diseases that can be diagnosed?
5. Describe the different mechanisms of localization of radiopharmaceutical in a given organ.
6. What are colloids? What are they used for?
7. What is Bexar? Describe briefly about its use.
8. Mention the various ventilation scan agents.

III. Short Answers on:

(10 X 3 = 30)

1. How will you separate I131 from the fission products of U235?
2. What is the mechanism of localization of MAA in the lungs?
3. State the recommended temperature for storage of Tc99m sulfur colloid.
4. How will you separate I131 from the fission products of U235?
5. Why do you wait for 3 hours for bone scan imaging after injection?
6. Mention the dose limits of packages of radioactive material.
7. What is the recommended temperature for storage of Tc99m MAA?
8. Why is I131 MIBG is taken up by neuro blastoma?
9. What are the most useful phosphonate compounds for bone imaging?
10. State the disadvantage of liquid column generator (Solvent extraction)

[LE 0212]

FEBRUARY 2014

Sub.Code:2112

**B.SC. NUCLEAR MEDICINE TECHNOLOGY
SECOND YEAR
PAPER – II RADIOCHEMISTRY & RADIO PHARMACY
Q.P. Code: 802112**

Time: Three hours

Maximum: 100 Marks

Answer all questions

I. Elaborate on:

(3 X 10 = 30)

1. Describe the structure of nephron and various radiopharmaceuticals used in renal function evaluation.
2. What are ligands and chelating agents? Define coordination number and explain complex formation.
3. Define radionuclide purity. Describe how radionuclide purity can be Estimated.

II. Write Notes on:

(8 X 5 = 40)

1. Describe the chemistry of Tc99m, its reduction, and labeling
2. Describe the electrovalent or ionic bond
3. Describe the coordinate covalent bond.
4. Describe an ideal radiopharmaceutical.
5. Mention the major four steps in the synthesis of thyroid hormone.
6. Why is Alumina undesirable in Tc99m eluate? What is the permissible limit of Aluminium concentration in Tc99m eluate?
7. Why is Tc99m RBC preferred to Tc99m Sulfur colloid in GI bleeding scan?
8. Describe the various types of quality control tests to be performed for radiopharmaceutical

III. Short Answers on:

(10 X 3 = 30)

1. Describe the covalent bond.
2. Describe the effective half life.
3. Mention the important column generators used in nuclear medicine.
4. Mention the upper limit of Mo99 that can be permitted in Mo-Tc99m eluate .
5. What should be the optimum range of size of particles in Tc99m MAA preparation.
6. Mention the maximum energy of beta particle and energy of gamma ray in I 131
7. What is mean life of an isotope?
8. What is the common collimator used in nuclear medicine
9. Describe the methods of labeling RBCs with Tc99m
10. Mention the non-PET radiopharmaceuticals used in tumor imaging.

[LF 0212]

AUGUST 2014

Sub.Code :2112

B.Sc. NUCLEAR MEDICINE TECHNOLOGY

SECOND YEAR

PAPER – II RADIOCHEMISTRY & RADIO PHARMACY

Q.P. Code: 802112

Time: Three hours

Maximum: 100 Marks

Answer All questions

I. Elaborate on:

(3 X 10 = 30)

1. Explain the various quality control tests for a radio-pharmaceutical.
2. Explain Iodination of I131 – mIBG.
3. Explain radionuclide separation techniques.

II. Write Notes on:

(8 X 5 = 40)

1. General methods of radiolabelling.
2. Line of stability.
3. Generator efficiency.
4. In-Vitro RBC cell labelling.
5. Transient Equilibrium.
6. Coordinate covalent bond.
7. Labelling IDA derivatives with Tc99m.
8. Ge68 – Ga68 generator system.

III. Short Answers on:

(10 X 3 = 30)

1. Effective half life.
2. Stereoisomers.
3. Carrier free.
4. Chemical structure of DTPA.
5. Buffer.
6. In-house preparations.
7. Head damaged RBC`s.
8. P-C-P bonds.
9. Sulfur colloid labeling.
10. Molarity.

[LG 0215]

FEBRUARY 2015

Sub.Code :2112

B.Sc. NUCLEAR MEDICINE TECHNOLOGY

SECOND YEAR

PAPER II – RADIOCHEMISTRY AND RADIO PHARMACY

Q.P. Code: 802112

Time: Three Hours

Maximum: 100 Marks

Answer All questions

I. Elaborate on:

(3 x 10 = 30)

1. Describe the six major methods in the preparation of labeled compounds.
2. What are ligands and chelating agents? Define coordination number and explain complex formation.
3. Discuss the different radiopharmaceutical used for hepato biliary and reticuloendotehlial imaging of liver.

II. Write Notes on:

(8 x 5 = 40)

1. Mention the methods of sterilization.
2. Describe the different mechanisms of localization of radiopharmaceutical in a given organ.
3. Mention the upper limit of Mo99 that can be permitted in Mo-Tc99m eluate.
4. Why cadmium rods and graphite rods are used in reactor?
5. Describe the rabbit test for pyrogenicity testing.
6. Mention the features of an ideal therapeutic radiopharmaceutical.
7. List the ideal characteristics of a radionuclide generator.
8. What is the function of push-button isotope selector on a dose calibrator?

III. Short Answers on:

(10 x 3 = 30)

1. Mention the different radiopharmaceutical used for cerebral perfusion imaging.
2. What are the common radionuclide contaminants in Moly generator?
3. Why is the specific activity of fission produced Isotopes are higher than those in reactor (n.γ)?
4. What is the difference between MAA and colloid particles?
5. Why are gelatin and EDTA added to Tc99m sulfur colloid?
6. State the recommended temperature for storage of Tc9m sulfur colloid.
7. Why do you wait for 3 hours for bone scan imaging after injection?
8. Mention the dose limits of packages of radioactive material.
9. What are the differences between an ionization chamber and Geiger Muller counter?
10. Name the two solvent systems used in Tc99m extraction.

[LH 0815]

AUGUST 2015

Sub.Code :2112

B.Sc. NUCLEAR MEDICINE TECHNOLOGY

SECOND YEAR

PAPER II – RADIOCHEMISTRY AND RADIO PHARMACY

Q.P. Code: 802112

Time: Three Hours

Maximum: 100 Marks

Answer All questions

I. Elaborate on:

(3 x 10 = 30)

1. What is DTPA? How is it useful in Nuclear Medicine. Elaborate on Preparation of DTPA cold kit?
2. What are the different Nuclear Reactor produced medically useful Isotopes. Write in detail on any ONE isotope?
3. What is pH value? Describe role of pH in preparation of radiopharmaceuticals.

II. Write Notes on:

(8 x 5 = 40)

1. Basic principles of Radio iodination.
2. Chemistry of Tc-99m.
3. Redox reactions.
4. Germanium- Gallium generator.
5. Radiochemical purity.
6. Fluorine-18 radiopharmaceuticals.
7. Pyrogen testing for radiopharmaceutical.
8. Ion exchange.

III. Short Answers on:

(10 x 3 = 30)

1. Solvent extraction.
2. Analytic balance.
3. Specific activity.
4. Skeletal imaging agents.
5. Metathesis reactions.
6. Radiolabelling of leucocytes.
7. Role of Cadmium rods and graphite in the reactor.
8. Neutron capture.
9. Aluminium breakthrough.
10. What is an ideal radiopharmaceutical?

[LI 0216]

FEBRUARY 2016

Sub.Code :2112

B.Sc. NUCLEAR MEDICINE TECHNOLOGY

SECOND YEAR

PAPER II – RADIOCHEMISTRY AND RADIO PHARMACY

Q.P. Code: 802112

Time: Three Hours

Maximum: 100 Marks

Answer All questions

I. Elaborate on:

(3 x 10 = 30)

1. What is DMSA? Give its indication in Nuclear Medicine? Elaborate on preparation of DMSA cold kit.
2. Mechanisms of localization of radiopharmaceuticals.
3. What are the different generator produced Isotopes? Write in detail on any ONE isotope.

II. Write Notes on:

(8 x 5 = 40)

1. General methods of labeling.
2. Preparation of Tc-99m Albumin colloid.
3. Radio iodinated radiopharmaceuticals.
4. Gel chromatography.
5. Describe the methods of preparation of F18 FDG.
6. Describe the general methods of Tc99m labeling of phosphonate compounds.
7. Tc-99m Macro aggregated albumin.
8. Biological tests for radiopharmaceuticals.

III. Short Answers on:

(10 x 3 = 30)

1. Tc-99m Sestamibi.
2. Procedure to label platelets with In-111 –oxine.
3. Cardiac imaging agents.
4. Equations governing radionuclide generator systems.
5. What are Buffer solutions?
6. Coordinate covalent bonds.
7. What is the allowable radionuclide impurities in Tc99m pertechnetate?
8. Membrane filtration.
9. Radioiodination of antibody.
10. What are Colloids? What are they used for?

[LJ 0816]

AUGUST 2016

Sub.Code :2112

B.Sc. NUCLEAR MEDICINE TECHNOLOGY

SECOND YEAR

PAPER II – RADIOCHEMISTRY AND RADIO PHARMACY

Q.P. Code: 802112

Time: Three Hours

Maximum: 100 Marks

Answer All questions

I. Elaborate on:

(3 x 10 = 30)

1. Explain RBC cell labelling with Tc^{99m} .
2. Explain Solvent extraction method of separating Tc^{99m} from Mo99, and the Mo99 breakthrough test for checking the radionuclide purity.
3. Explain various radiochemical quality control procedures for radiopharmaceuticals.

II. Write Notes on:

(8 x 5 = 40)

1. Secular Equilibrium.
2. Medical Cyclotron principle.
3. Explain the approaches to design a radio-pharmaceutical.
4. Pyrogenicity testing.
5. Tc^{99m} GHA labelling procedure.
6. Ga67 Radiopharmaceuticals and its applications.
7. Explain Open and Closed procedures done in radiopharmacy.
8. Lyophilization of cold kits.

III. Short Answers on:

(10 x 3 = 30)

1. Mobile phase.
2. Antioxidants.
3. FDG.
4. Biological half life.
5. Ligands used for cell labeling.
6. Lympho scintigraphy tracers.
7. Chemical structure of MDP.
8. Pipetting techniques.
9. Immunology.
10. Antigen – antibody reaction.

[LK 0217]

FEBRUARY 2017

Sub.Code :2112

B.Sc. NUCLEAR MEDICINE TECHNOLOGY

SECOND YEAR

PAPER II – RADIOCHEMISTRY AND RADIO PHARMACY

Q.P. Code: 802112

Time: Three Hours

Maximum: 100 Marks

Answer All questions

I. Elaborate on:

(3 x 10 = 30)

1. Explain the mechanism and localization of radiopharmaceuticals.
2. Explain the various equilibrium's in generator produced radionuclides.
3. Explain cell labeling with Tc^{99m} .

II. Write Notes on:

(8 x 5 = 40)

1. Radio-iodination methods.
2. Radionuclide generators for Tc^{99m} .
3. pH importance in radiopharmaceuticals.
4. LAL test.
5. Chromatography.
6. Moly breakthrough test.
7. Reactor produced radionuclides.
8. Radionuclide separation techniques.

III. Short Answers on:

(10 x 3 = 30)

1. Tc^{99m} DTPA structure.
2. Antioxidants.
3. Various bone imaging tracers.
4. Coordination bone.
5. Chelating agents.
6. Radiolysis.
7. I^{131} mIBG.
8. Centrifuge.
9. Neutron capture.
10. Tracers used for infection imaging.

[LL 0817]

AUGUST 2017

Sub. Code: 2112

**B.Sc. NUCLEAR MEDICINE TECHNOLOGY
SECOND YEAR
PAPER II – RADIOCHEMISTRY AND RADIO PHARMACY**

Q.P. Code: 802112

Time: Three Hours

Maximum: 100 Marks

Answer all questions

I. Elaborate on:

(3 x 10 = 30)

1. Discuss various factors that should be considered in the labeling procedure.
2. Write the principle of Radionuclide Generator and Construction of Column Generator.
3. Explain RBC cell labeling with Tc99m.

II. Write notes on:

(8 x 5 = 40)

1. Explain the correct use of Syringes, Pipettes, Balance and Centrifuge.
2. Describe Biochemistry and Immunology.
3. Antigen – Antibody reaction.
4. Sterility check of Radiopharmaceuticals.
5. Explain Lipids and Profiles.
6. Radiochemical purity.
7. Gel chromatography.
8. Ge68–Ga68 Generator system.

III. Short answers on:

(10 x 3 = 30)

1. Explain analytic balance.
2. Explain Specific activity.
3. Normality of Solution.
4. Explain carrier free.
5. Tc99m Phytate.
6. Molecular Structure of Tc99m MDP.
7. Difference of Solute and Solvents.
8. What are Buffer Solutions?
9. Excitation Labeling.
10. Gelatin- applications in nuclear medicine.

[LM 0218]

FEBRUARY 2018

Sub. Code: 2112

**B.Sc. NUCLEAR MEDICINE TECHNOLOGY
SECOND YEAR
PAPER II – RADIOCHEMISTRY AND RADIO PHARMACY**

Q.P. Code: 802112

Time: Three Hours

Maximum: 100 Marks

Answer all questions

I. Elaborate on:

(3 x 10 = 30)

1. Explain the factors influencing the design of new radiopharmaceuticals.
2. Explain the principles of Cyclotron Produced Radionuclides with examples.
3. Explain Iodination of I^{131} - mIBG.

II. Write notes on:

(8 x 5 = 40)

1. Discuss the washing and autoclaving methods for glass wares.
2. Explain Molecular Biology and Immunology.
3. Explain the Target and its processing of Radionuclides.
4. Define Physical and Biological Half-Life.
5. Explain Proteins and Amino acids.
6. Explain Transient Equilibrium.
7. Mention the methods of Sterilization.
8. Lyophilization of cold kits.

III. Short answers on:

(10 x 3 = 30)

1. Define Acids and Bases.
2. Membrane Filtration.
3. Explain Mobile phase.
4. Dative Bond and Hydrogen Bond.
5. Ion Exchange reaction.
6. Explain references of 100%, 50% & 10%.
7. Protein Binding.
8. Shelf – Life.
9. Head damaged RBC's.
10. Tracer Kinetics.

[LN 0818]

AUGUST 2018

Sub. Code: 2112

**B.Sc. NUCLEAR MEDICINE TECHNOLOGY
SECOND YEAR
PAPER II – RADIOCHEMISTRY AND RADIO PHARMACY**

Q.P. Code: 802112

Time: Three Hours

Maximum: 100 Marks

Answer all questions

I. Elaborate on: **(3 x 10 = 30)**

1. Describe about Radio-iodinated Radiopharmaceuticals
2. Explain the construction of liquid generator and Quality control of ^{99m}Tc -Eluate.
3. What is pH value? Describe the role of pH in preparation of radiopharmaceuticals.

II. Write notes on: **(8 x 5 = 40)**

1. Explain the receipt storage and disposal of radioactive materials.
2. Explain molecular Biology and Biochemistry.
3. Explain short lived Radionuclides.
4. Preparation of standard (Reference) solution.
5. Explain oxidation and Reduction.
6. Explain line of stability.
7. Atomic and Molecular structure.
8. Describe the coordinate covalent bond.

III. Short answers on: **(10 x 3 = 30)**

1. Hydrogen Ion concentration.
2. Tin pyrophosphate.
3. Lyophilization.
4. Why do we wait for 48 Hrs for TWB Image after TWB dose?
5. Valency and Atomic Weight.
6. Compartmental models.
7. Monoclonal Antibody.
8. Explain Mo99m Contamination check.
9. Why is ^{131}I -mIBG is taken up by neuroblastoma?
10. Describe Effective Half-Life.

**B.Sc. NUCLEAR MEDICINE TECHNOLOGY
SECOND YEAR
PAPER II – RADIOCHEMISTRY AND RADIO PHARMACY**

Q.P. Code: 802112

Time: Three Hours**Maximum: 100 Marks**

Answer all questions

I. Elaborate on:**(3 x 10 = 30)**

1. Discuss the different radiopharmaceuticals used for hepatobiliary and Reticuloendothelial imaging of liver.
2. Describe the structure of nephron and various radiopharmaceuticals used in renal function evaluation.
3. What are ligands and chelating agents? Define coordination number and explain complex formation.

II. Write notes on:**(8 x 5 = 40)**

1. Germanium – Gallium generator.
2. Describe the rabbit test for pyrogenicity.
3. Mention about Target to non-Target Ratio.
4. Why are gelatin and EDTA added to Tc99m sulfur colloid?
5. What are the differences between an ionization chamber and Geiger Muller counter?
6. Basic principles of Radio iodination.
7. Medical Cyclotron principle.
8. Redox reactions.

III. Short answers on:**(10 x 3 = 30)**

1. Various bone imaging tracers.
2. Chelating agents.
3. Centrifuge.
4. Tracers used for infection imaging.
5. What is the compound for myocardial infarct imaging? Mention the time of imaging after injection and dose used.
6. What is Bexar? Describe briefly about its use.
7. How do you perform Meckel's diverticulum imaging?
8. What is the common radiopharmaceutical used for lymphoscintigraphy? What are the common diseases that can be diagnosed?
9. Mention the various ventilation scan agents.
10. State the disadvantage of liquid column generator (solvent extraction).

**B.Sc. NUCLEAR MEDICINE TECHNOLOGY
SECOND YEAR
PAPER II – RADIOCHEMISTRY AND RADIO PHARMACY**

Q.P. Code: 802112

Time: Three Hours**Maximum: 100 Marks**

Answer all questions

I. Elaborate on:**(3 x 10 = 30)**

1. Explain the mechanism and localization of radiopharmaceuticals.
2. Explain the various equilibrium's in generator produced radionuclides.
3. Explain the principles of cyclotron produced radionuclides with examples.

II. Write notes on:**(8 x 5 = 40)**

1. Lyophilization of cold kit.
2. Ga67 radiopharmaceuticals and its applications.
3. Chromatography.
4. Reactor produced radionuclides.
5. Basic principles of radio iodination.
6. Radiochemical purity.
7. Co2 urea breathe wave test.
8. LAL test.

III. Short answers on:**(10 x 3 = 30)**

1. List the ideal characteristics of a radionuclide generator.
2. Gel chromatography.
3. What are buffer solutions?
4. Why is the specific activity of fission produced Isotopes are higher than those in reactor (n.γ)?
5. State the oxidation states of Tc99m in a Tc99m DTPa Tc99m albumin and Tc99m HIDA.
6. Why is Tc99m RBC preferred to Tc99m sulfur colloid in GI bleeding scan?
7. Mention the maximum energy of beta particle and energy of gamma ray in I 131.
8. Chemical structure of DTPA.
9. Mention the different radiopharmaceutical used for cerebral perfusion imaging.
10. HPLC.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[AHS 0321]

MARCH 2021

Sub. Code: 2112

(AUGUST 2020 EXAM SESSION)

B.Sc. NUCLEAR MEDICINE TECHNOLOGY

SECOND YEAR (Regulations 2010-2011)

PAPER II – RADIOCHEMISTRY AND RADIO PHARMACY

Q.P. Code : 802112

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate on:

(3 x 10 = 30)

1. What are the different Nuclear Reactor produced medically useful Isotopes? Write in detail on any ONE isotope.
2. Mechanisms of localization of radiopharmaceuticals. Explain RBC cell labeling with Tc99m.
3. Explain various radiochemical quality control procedures for Radiopharmaceuticals.

II. Write notes on:

(8 x 5 = 40)

1. Germanium – Gallium generator.
2. Fluorine – 18 radiopharmaceuticals.
3. Co2 Urea breathe wave test.
4. Why cadmium rods and graphite rods are used in reactor?
5. P-C-P bonds.
6. What is the function of push-button isotope selector on a dose calibrator?
7. Secular equilibrium.
8. Medical Cyclotron principle.

III. Short answers on:

(10 x 3 = 30)

1. Why do you wait for 3 hours for bone scan imaging after injection?
2. Mention the dose limits of packages of radioactive material.
3. Tc99m Phytate.
4. Mobile phase.
5. Tc99m GHA labeling procedure.
6. Chemical structure of MDP.
7. Neutron capture.
8. Labelling IDA derivatives with Tc99m.
9. Stereoisomers.
10. Carrier free.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[AHS 0222]

**FEBRUARY 2022
(AUGUST 2021 EXAM SESSION)**

Sub. Code: 2112

**B.Sc. NUCLEAR MEDICINE TECHNOLOGY
SECOND YEAR (Regulations 2010-2011)
PAPER II – RADIOCHEMISTRY AND RADIO PHARMACY
Q.P. Code : 802112**

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate on:

(3 x 10 = 30)

1. Explain RBC cell labeling with Tc99m.
2. Discuss various factors that should be considered in the labeling procedure.
3. Elaborate the radionuclide separation technique.

II. Write notes on:

(8 x 5 = 40)

1. Secular equilibrium.
2. Lyophilization of cold kit.
3. Tc99m GHA labelling procedure.
4. Gallium 67 radiopharmaceuticals and its application.
5. REDOX reactions.
6. Ge /Ga generator.
7. Mention the upper limit of Molybdenum 99, Alumina that can be permitted in Molybdenum 99 /Technetium-99 eluate.
8. List the features of ideal radionuclide generator.

III. Short answers on:

(10 x 3 = 30)

1. Localization and optimum range of size of particles in Tc99m MAA preparation.
2. Separation of I131 from fission products.
3. Recommended storage of Tc99m Sulfur colloid.
4. Why do you wait for 3 hours for bone scan after injection?
5. MIBG uptake by Neuroblastoma.
6. Liquid column generator disadvantage.
7. Radiopharmaceuticals for cerebral perfusion imaging.
8. Reason for high specific activity of fission produced Isotopes than reactor Produced Isotopes.
9. Role of Cadmium rods and graphite in the reactor.
10. Chemical structure of MDP.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[AHS 0423]

APRIL 2023

Sub. Code: 2112

**B.Sc. NUCLEAR MEDICINE TECHNOLOGY
SECOND YEAR (Regulations 2010-2011 & 2018-2019 onwards)
PAPER II – RADIOCHEMISTRY AND RADIO PHARMACY
Q.P. Code: 802112**

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate on:

(3 x 10 = 30)

1. Write the Various Quality Controls for a Radiopharmaceutical.
2. Describe the Principles of Cyclotron produced Radionuclides with examples.
3. Describe the Chemistry of Tc99m, its Reduction and Labelling.

II. Write Notes on:

(8 x 5 = 40)

1. Gel chromatography.
2. Tc99m Macro aggregated Albumin.
3. Characteristics of Ideal Therapeutic Radiopharmaceutical.
4. Transient Equilibrium.
5. Tc99m GHA labelling procedure.
6. Tracers for Infection Imaging.
7. Lymphoscintigraphy Tracers.
8. Short lived Radionuclides.

III. Short Answers on:

(10 x 3 = 30)

1. Sulfur colloid labelling.
2. Normality of Solution.
3. Sesta MIBI.
4. Two solvent systems in Tc99m extraction.
5. What are Buffer solutions?
6. Physical half –life.
7. Carrier Free State.
8. Radiolysis.
9. Specific activity.
10. Covalent co-ordinate bond.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[AHS 0424]

APRIL 2024

Sub. Code: 2112

**B.Sc. NUCLEAR MEDICINE TECHNOLOGY
SECOND YEAR (Regulations 2010-2011 & 2018-2019 onwards)
PAPER II – RADIOCHEMISTRY AND RADIO PHARMACY
Q.P. Code: 802112**

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate on:

(3 x 10 = 30)

1. Write the Principle of Radionuclide Generator and Construction of Column Generator.
2. Explain the Various Equilibrium in Generator Produced Radionuclides.
3. Write briefly about

a) Ligands	b) Chelating agents
c) Complex Formation	d) pH values.

II. Write Notes on:

(8 x 5 = 40)

1. Pyrogen testing for Radiopharmaceuticals.
2. Line of Stability.
3. Radio Chemical purity
4. Oxidation state of Tc99m in DTPA, Albumin and HIDA.
5. Methods of Sterilization.
6. Mention the upper limit of Mo99 and Alumina permitted in Mo99-Tc99m eluate.
7. Shelf-life.
8. Lyophilization of Cold Kit.

III. Short Answers on:

(10 x 3 = 30)

1. Recommended Storage of Tc99m Sulfur colloid.
2. Why do you wait for 3 hours for bone scan after injection?
3. MIBG uptake by Neuroblastoma.
4. Liquid Column Generator - disadvantage.
5. Heat Damaged RBC.
6. Effective half-life.
7. P-C-P bonds.
8. Membrane Filtration.
9. What is the mean-life of an isotope?
10. Tc99m-phytate.
