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

[AHS 0321] MARCH 2021 Sub. Code: 2306

(OCTOBER 2020 EXAM SESSION)

M.Sc. NUCLEAR MEDICINE TECHNOLOGY

FIRST YEAR (From 2019-2020 onwards)

PAPER VI – NUCLEAR MEDICINE INSTRUMENTATION - I

Q.P. Code : 282306

Time: Three hours Answer ALL Questions Maximum: 100 Marks

I. Elaborate notes on: (2 x 20 = 40)

1. Discuss the principles involved in SPECT and PET Image Reconstruction and the use of Filters to remove Noise from the SPECT and PET Images.
2. Explain the fundamental operation of a dedicated PET Scanner, its design and how it acquires and stores data.

II. Write Short Notes on: (10x6 = 60)

1. Pulse Height Analyser and its use as energy discriminator.
2. Concept of SPECT Imaging and various SPECT Acquisition modes.
3. Iterative Reconstruction Algorithm and 3D Image Display.
4. Image Quality and Artefacts in SPECT Imaging.
5. Nyquist frequency and Cut off frequency: Effect on Imaging smoothening and noise.
6. List of Detector Crystals that can be used in PET Imaging and their salient features.
7. Time of Flight Scanners.
8. Decommissioning of a Nuclear Medicine and Cyclotron facility.
9. Fundamental Operation of a PET CT.
10. Quality Management Systems in Nuclear Medicine.

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

[AHS 0921] **SEPTEMBER 2021** **Sub. Code: 2306**
(MAY 2021 EXAM SESSION)

M.Sc. NUCLEAR MEDICINE TECHNOLOGY
FIRST YEAR (From 2019-2020 onwards)
PAPER VI – NUCLEAR MEDICINE INSTRUMENTATION - I
Q.P. Code : 282306

Time: Three hours **Answer ALL Questions** **Maximum: 100 Marks**

I. Elaborate notes on: **(2 x 20 = 40)**

1. Briefly describe the parameters for assessment of performance of radiation detector and explain the properties of a gas-filled ionization detector.
2. Describe the physical principles and components in the basic design of a PET/CT system and explain the principles of quality control of PET/CT system.

II. Write Short Notes on: **(10x6 = 60)**

1. Photomultiplier Tube.
2. Collimators used in gamma camera imaging.
3. Calibration procedure for dose calibrator.
4. Time of flight scanners.
5. Poisson distribution.
6. Scintillation crystal.
7. Design of an intra-operative gamma probe.
8. Energy descriminator.
9. Co-registration of PET/CT.
10. Butterworth filter.

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

[AHS 0222] **FEBRUARY 2022** **Sub. Code: 2306**
(OCTOBER 2021 EXAM SESSION)

M.Sc. NUCLEAR MEDICINE TECHNOLOGY
FIRST YEAR
(Candidates admitted from 2019-2020 onwards – Paper VI)
(Candidates admitted from 2020-2021 onwards – Paper VII)
PAPER VI & VII – NUCLEAR MEDICINE INSTRUMENTATION - I
Q.P. Code : 282306

Time: Three hours **Answer ALL Questions** **Maximum: 100 Marks**

I. Elaborate notes on: **(2 x 20 = 40)**

1. What is a Collimator of a Gamma Camera. Discuss in detail about the properties of various types of Collimators commonly used in a Clinical Setting.
2. Describe the construction and operating principles of all Non-Scintillation Detectors.

II. Write Short Notes on: **(10x6 = 60)**

1. Difference between Liquid Scintillation Counting System and Scintillation Crystal System.
2. Define NEMA Standards and its application in Nuclear Medicine.
3. List out and discuss various Quality Control Parameters required in SPECT Camera.
4. Draw a diagram and explain about Digital Storage of Images.
5. Techniques used to acquire Gated Cardiac SPECT.
6. Attenuation Correction by low dose CT images and Scatter Correction methods.
7. Definition of SUV, its calculation and use to generate quantitative measurements.
8. Partial Volume Effect and its significance.
9. Solid State Photo detectors and its use in Nuclear Medicine.
10. How to disinfect SPECT – CT facility during in the era of COVID patient imaging.

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

[AHS 0522] **MAY 2022** **Sub. Code: 2306**

M.Sc. NUCLEAR MEDICINE TECHNOLOGY
FIRST YEAR
(Candidates admitted from 2019-2020 onwards – Paper VI)
(Candidates admitted from 2020-2021 onwards – Paper VII)
PAPER VI & VII – NUCLEAR MEDICINE INSTRUMENTATION - I
Q.P. Code : 282306

Time: Three hours **Answer ALL Questions** **Maximum: 100 Marks**

I. Elaborate notes on: **(2 x 20 = 40)**

1. Define SPECT and explain the basic principles behind the emission computed tomography.

2. Explain the steps involved in preparation of a patient for 18F-FDG PET Scan. Also list out the various modes of PET-CT Acquisition.

II. Write Short Notes on: **(10x6 = 60)**

1. Interpretation of Sensitivity, Specificity, Prevalance and Accuracy and use in Nuclear Medicine.
2. Design and Operation of PET-CT system.
3. Describe Filters and explain the Low pass filter and Restoration filters.
4. Imaging techniques and Acquisition Parameters in obtaining flow studies, blood pool imaging – with specific response to performing a Bone Scan.
5. Filtered Back Projection and Iterative Reconstruction: Salient points.
6. Circular and Body countour orbits in SPECT CT Image acquisition.
7. Routine Quality Control Parameters in a SPECT CT.
8. Preparation and Imaging a Child with PET CT.
9. Partial volume effect and its significance in image reconstruction.
10. Intraoperative Gamma Probes.

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