

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

[AHS 0122]

**JANUARY 2022
(OCTOBER 2021 EXAM SESSION)**

Sub. Code: 2311

**M.Sc. NUCLEAR MEDICINE TECHNOLOGY
SECOND YEAR (From 2019-2020 onwards)
PAPER I-NUCLEAR MEDICINE INSTRUMENTATION – II - MRI, PET & SPECT
Q.P. Code : 282311**

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

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

1. Discuss the principle, working and components of gamma camera?
2. Explain the advantages and disadvantages of hybrid nuclear medicine imaging modalities?

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

1. Use of Collimators and different collimators used in gamma imaging?
2. Explain working of Analogue to digital converter (ADC)?
3. Brief note on Time-of-flight (TOF) imaging in PET?
4. Explain Filtered back projection and filters used in nuclear medicine (High pass and low pass filters)?
5. Ideal properties of scintillating crystals used in Nuclear Medicine?
6. Factors affecting resolution of PET imaging?
7. Compare 2D and 3D PET imaging?
8. Attenuation correction imaging in PET imaging?
9. Explain the working of a photo multiplier tube (PMT) with help of a diagram?
10. What is Standardized Uptake Value (SUV), its significance in PET imaging and Factors affecting SUV?

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

[AHS 1022]

OCTOBER 2022

Sub. Code: 2311

**M.Sc. NUCLEAR MEDICINE TECHNOLOGY
SECOND YEAR (From 2019-2020 & 2020-2021 onwards)
PAPER I - NUCLEAR MEDICINE INSTRUMENTATION – II MRI, PET & SPECT
Q.P. Code : 282311**

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate notes on:

(2 x 20 = 40)

1. Briefly explain the factors affecting performance characteristics of gamma camera.
2. Explain the working principle of PET scanner.

II. Write Short Notes on:

(10x6 = 60)

1. What is the function of light guide, amplifier and pulse height analyser?
2. Explain why the sodium iodide doped with thallium [NaI (Tl)] crystal is not used in recent PET scanners and mention other crystals used in PET scanners.
3. Explain partial volume effect.
4. What is scatter radiation and how is it corrected in NM imaging?
5. Write short note on common image artifacts in SPECT imaging and the corrective measures.
6. Explain the trade-off between resolution and sensitivity in regards of collimator and crystal properties.
7. What is Non collinearity in PET imaging? Explain with the help of diagram.
8. Explain edge packing. What is central field of view (CFOV) and useful field of view (UFOV)?
9. Factors affecting resolution and sensitivity in PET imaging.
10. Write short note on iterative reconstruction.

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

[AHS 1023]

OCTOBER 2023

Sub. Code: 2311

M.Sc. NUCLEAR MEDICINE TECHNOLOGY

SECOND YEAR (From 2020-2021 onwards)

PAPER I - NUCLEAR MEDICINE INSTRUMENTATION – II MRI, PET & SPECT

Q.P. Code: 282311

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate notes on:

(2 x 20 = 40)

1. Data acquisition for SPECT.
2. Performance Characteristics of PET System.

II. Write Short Notes on:

(10x6 = 60)

1. Receiver Operating Characteristic Study (ROC study).
2. Simple back projection.
3. Expectation maximization reconstruction.
4. Whole body PET system.
5. Basic principle of PET MR.
6. Correction for random coincidences in PET imaging.
7. Noise Equivalent Counting Rate (NECR).
8. Possible sources of Artifacts for CT based correction.
9. Time of flight PET.
10. X-ray tube.

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

[AHS 1024]

OCTOBER 2024

Sub. Code: 2311

M.Sc. NUCLEAR MEDICINE TECHNOLOGY

SECOND YEAR (From 2020-2021 onwards)

PAPER I - NUCLEAR MEDICINE INSTRUMENTATION – II MRI, PET & SPECT

Q.P. Code: 282311

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate notes on:

(2 x 20 = 40)

1. Line spread function of collimators.
2. Cyclotron layout and Approval and Quality Control Procedures.

II. Write Short Notes on:

(10x6 = 60)

1. Artifacts in SPECT and measures to overcome it.
2. Baseline shift and pulse pile up.
3. Radiation protection in PET.
4. Image reconstruction Algorithm in PET.
5. 3D- PET reconstruction.
6. Transmission scans and attenuation maps.
7. Modified block detectors for PET.
8. Digital Image processing Techniques.
9. Attenuation and Scatter Correction using CT.
10. Performance characteristics of PET systems.

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

[AHS 1025]

OCTOBER 2025

Sub. Code: 2311

**M.Sc. NUCLEAR MEDICINE TECHNOLOGY
SECOND YEAR (From 2020-2021 onwards)
PAPER I - NUCLEAR MEDICINE INSTRUMENTATION – II MRI, PET &
SPECT**

Q.P. Code: 282311

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate notes on:

(2 x 20 = 40)

1. Explain the advantages and disadvantages of hybrid nuclear medicine imaging modalities.
2. Explain the working principle of PET scanner.

II. Write Short Notes on:

(10x6 = 60)

1. Receiver Operating Characteristic Study (ROC study).
2. Compare 2D and 3D PET imaging.
3. Explain edge packing. What is central field of view (CFOV) and useful field of view (UFOV)?
4. Write short note on iterative reconstruction.
5. What is Standardized Uptake Value (SUV), its significance in PET imaging and Factors affecting SUV?
6. Explain Filtered back projection and filters used in nuclear medicine (High pass and low pass filters)
7. Possible sources of Artifacts for CT based correction.
8. What is Non- collinearity in PET imaging? Explain with the help of diagram.
9. Intrinsic efficiency and extrinsic collimator efficiency of Gamma camera.
10. Time of flight PET.
