[LF 0212] **AUGUST 2014** **Sub.Code :2123**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY
THIRD YEAR
PAPER III – QUALITY ASSURANCE IN NUCLEAR MEDICINE
Q.P. Code: 802123

Time: Three hours **Maximum : 100 Marks**

Answer All questions

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

1. What steps to be followed for Quality standard such as ISO-9001/NABH in Nuclear Medicine Dept?
2. Draw a model Nuclear Medicine Diagnostic department plan and explain in respect of its public safety, contamination and in quality control.
3. Explain the general QA test procedures in scintillation and Gamma detectors.

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

1. Write the test for spatial resolution of point source in PET scan
2. Write the test for Volume response of the system in PET scan
3. Write the test for center of rotation(COR) calibration in H-&L- mode in SPECT scan.
4. Write the test for Intrinsic/Extrinsic uniformity uniformity & sensitivity in SPECT scan.
5. Write the test for Energy Spectrum/Energy Window calibration in Scintillation detectors.
6. Write the test for precision and Linearity for Radiation survey meter.
7. Write about the Jaszcazk phantom in respect of QA procedures.
8. Write the test for Photo Peak in SPECT scan.

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

1. Contamination Monitor.
2. Isotope calibrator.
3. Survey monitor.
4. Pin source.
5. Gamma zone monitor.
6. Thyroid uptake.
7. Zero adjustment test.
8. Energy resolution.
9. Photo peak.
10. Scintillation detector.

****

[LH 0815] **AUGUST 2015** **Sub.Code :2123**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY

THIRD YEAR

PAPER III – QUALITY ASSURANCE IN NUCLEAR MEDICINE

Q.P. Code: 802123

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

Answer All questions

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

1. Enumerate the acceptance tests during installation of gamma camera.
2. Describe the routine daily check (quality control of gamma camera, *dose* calibrator and uptake probe.
3. Define flood check, linearity, uniformity, dead time, resolution for gamma camera.

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

1. NEMA protocol.
2. External factors affecting Gamma camera performance.
3. Spatial linearity.
4. Field uniformity.
5. Spatial resolution.
6. Energy resolution.
7. Count rate capability.
8. Sensitivity.

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

1. Define quality control in NM.
2. Test for spatial resolution of point source in PET scan.
3. Survey meter.
4. Gamma zone monitor.
5. Photo peak.
6. Scintillation detector.
7. Test for volume response of the system in PET scan.
8. Energy resolution.
9. Sino gram.
10. FWHM and pixel size selection in SPECT.

****

[LJ 0816] AUGUST 2016 **Sub. Code: 2123**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY
THIRD YEAR
PAPER III – QUALITY ASSURANCE IN NUCLEAR MEDICINE

Q.P. Code: 802123

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

Answer all questions

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

1. Enumerate daily quality control, operating care and maintenance of gamma camera and caution taken in case of non-uniformity.
2. Enumerate the acceptance tests during installation of gamma camera.
3. Steps to be followed for quality standard as NABH. Draw a model of nuclear medicine and PET CT department.

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

1. Routine quality control procedure in PET scanners.
2. Standardized uptake value and factors affecting SUV.
3. Describe characteristics of PET scintillators.
4. Count rate capability spatial resolution.
5. Spatial resolution.
6. Energy resolution.
7. Define sensitivity.
8. Modulation transfer function.

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

1. Ionization chambers.
2. GM counters.
3. Dead time.
4. Resolution.
5. Factors affecting intrinsic resolution.
6. Pin source.
7. Thyroid uptake probe.
8. Liquid scintillation detector.
9. Whole body counter.
10. Center of rotation.

****

[LK 0217] **FEBRUARY 2017** **Sub. Code: 2123**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY
THIRD YEAR
PAPER III – QUALITY ASSURANCE IN NUCLEAR MEDICINE

Q.P. Code: 802123

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

Answer all questions

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

1. Routine quality control procedures for PET scanners.
2. How to set-up a nuclear medicine lab? Explain with Layout diagrams.
3. Enumerate reference tests of NEMA for SPECT system. What are the operational checks you will perform?

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

1. Pulse height spectrometry.
2. External factors affecting Gamma camera performance.
3. What does physical performance of PET compare with SPECT?
4. Enumerate desirable qualities of PET scintillator.
5. Enumerate test for precision and linearity in radiation survey meter.
6. Write short notes on flat field and focusing collimator.
7. What is time of light in PET?
8. What are methods can be used in acquisition to optimize resolution in SPECT?

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

1. System sensitivity measurement formula.
2. Gamma zone monitor.
3. Photo peak.
4. Isotope calibrator.
5. Step wedge.
6. Resolution.
7. Sodium iodide crystal.
8. Preventive maintenance.
9. Liquid scintillation counter.
10. Modulation transfer function.

****

[LL 0817] AUGUST 2017 **Sub. Code: 2123**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY
THIRD YEAR
PAPER III – QUALITY ASSURANCE IN NUCLEAR MEDICINE

Q.P. Code: 802123

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

Answer all questions

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

1. Enumerate operating care, maintenance of Gamma Camera, Quality Control and caution taken in case of non-uniformity.
2. Brief the routine daily check Quality control of gamma camera, dose Calibrator and uptake probe.
3. Describe the steps to be followed for Quality standard such as ISO 9001 / NABH in Nuclear Medicine Department.

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

1. Write the test for Volume response of the system in PET scan.
2. Explain the test for precision and Linearity for Radiation survey meter.
3. Modulation transfer function.
4. Spatial resolution.
5. Explain the test for Energy Window calibration/Energy spectrum in Scintillation detector.
6. External factors affecting Gamma Camera performance.
7. Counter rate capability.
8. Field uniformity.

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

1. Image quality.
2. COR alignment.
3. Background counts.
4. Linearity check.
5. Attenuation and scatter correction.
6. Constancy.
7. Radioactive spills.
8. Disposal of radioactive waste.
9. CDC Standard Precautions.
10. Scintillation Detector System.

****

[LM 0218] FEBRUARY 2018 **Sub. Code: 2123**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY
THIRD YEAR
PAPER III – QUALITY ASSURANCE IN NUCLEAR MEDICINE

Q.P. Code: 802123

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

Answer all questions

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

1. Describe the general Quality Assurance Test procedures in Scintillation and Gamma Detectors.
2. Enumerate the Acceptance Tests during installation of Gamma Camera.
3. Draw a model of Nuclear Medicine Diagnostic Department plan and explain in respect of its public safety, contamination and in Quality Control.

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

1. COR calibration in H and L mode in SPECT scan.
2. Modulation transfer function.
3. Write about the Jaszcazk phantom in respect of QA procedures.
4. NEMA protocol.
5. Factors affecting SUV.
6. Describe the test for Photo Peak in SPECT scan.
7. Sinogram.
8. Zero adjustment Test.

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

1. Isotope calibrator.
2. Survey meter.
3. GM Counters.
4. Photo peak.
5. Pin source.
6. Zero adjustment Test.
7. Dead time.
8. Thyroid uptake.
9. Center of rotation.
10. Resolution.

****

[LN 0818] AUGUST 2018 **Sub. Code: 2123**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY

THIRD YEAR

PAPER III – QUALITY ASSURANCE IN NUCLEAR MEDICINE

Q.P. Code: 802123

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

Answer all questions

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

1. NEMA tests for a SPECT gamma camera.
2. Test to find the reliability of a radiation counting equipment.
3. COR Test and its significance on clinical image.

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

1. Tomographic uniformity.
2. Collimator hole angulation test.
3. List the tests for a Dose calibrator.
4. Intrinsic Uniformity of a gamma camera.
5. Constancy and accuracy test of Dose calibrator.
6. Necessary documents for licensing of a SPECT gamma camera facility.
7. Linearity of Dose calibrator.
8. How to setup a nuclear medicine Lab?

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

1. Jaszack Phantom.
2. PLES phantom.
3. QA for registration of SPECT and CT system.
4. UFOV.
5. FWHM.
6. SNR.
7. Tomographic resolution.
8. SPECT resolution with scatter.
9. Extrinsic Flood.
10. CTDI.

****

[LO 0219] FEBRUARY 2019 **Sub. Code: 2123**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY

THIRD YEAR

PAPER III – QUALITY ASSURANCE IN NUCLEAR MEDICINE

Q.P. Code: 802123

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

Answer all questions

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

1. Iso-response curve for the flat field collimator and its significance.
2. Record maintenance that has to be done for radionuclides / radiopharmaceuticals in a nuclear medicine department with their significance.
3. Explain why and how frequent departmental radiation survey should be performed with their limits.

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

1. Explain how the half-life of a radionuclide is determined with the help of a dose calibrator.
2. Pixel size determination for a gamma camera.
3. Geometric / Volumetric variation of Dose calibrator.
4. List and briefly NEMA tests for a SPECT gamma camera.
5. Total performance test of SPECT gamma camera.
6. Performance tests for a radiation survey-meter.
7. Linearity of Dose calibrator.
8. System sensitivity for LEHR.

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

1. Integral Uniformity.
2. COR calculation formula.
3. NEMA tests for a SPECT gamma camera.
4. Dead time.
5. Chi-square test.
6. List three factors that affect the gamma camera performance.
7. Count rate capability.
8. NEMA slit phantom.
9. PSF.
10. Test for Whole body in a gamma camera.

****

[LP 0819] AUGUST 2019 **Sub. Code: 2123**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY

THIRD YEAR

PAPER III – QUALITY ASSURANCE IN NUCLEAR MEDICINE

Q.P. Code: 802123

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

Answer all questions

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

1. NEMA System Spatial resolution test for a gamma camera.
2. Explain the calibration of uptake probe.
3. Enumerate on the acceptance test of a SPECT gamma camera.

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

1. Procedure to test the dead time of a gamma camera.
2. Focal distance calibration for a thyroid uptake probe.
3. Differential Uniformity.
4. Registration test for a SPECT CT system and its significance.
5. Tomographic resolution.
6. Normalization of PET scanner.
7. Bulls eye artefact on SPECT image.
8. COR test.

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

1. Preventive maintenance service.
2. List four tests for radiation survey-meter.
3. Beam hardening artifact.
4. Energy resolution.
5. FWTM.
6. Daily tests for a gamma camera.
7. Test for a gamma zone monitor.
8. Ring artefact on CT image.
9. Factors affecting intrinsic resolution of a gamma camera.
10. Count rate capability test for gamma camera.

****

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

[LR 1220] DECEMBER 2020 Sub. Code: 2123
(AUGUST 2020 EXAM SESSION)

BACHELOR IN NUCLEAR MEDICINE TECHNOLOGY
THIRD YEAR
PAPER III – QUALITY ASSURANCE IN NUCLEAR MEDICINE
Q.P. Code: 802123

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

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

1. Enumerate daily quality control, operating care and maintenance of Gamma camera and caution taken in case of non-uniformity.
2. Brief the routine daily check Quality control of gamma camera, dose Calibrator and uptake probe
3. Enumerate the reference tests of NEMA tests for a SPECT gamma camera. What are the operational checks you will perform?

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

1. Write about the Jaszcazk phantom in respect of QA procedures.
2. Write the test for Intrinsic/Extrinsic uniformity & sensitivity in SPECT scan
3. Write the test for center of rotation (COR) calibration in H-&L- mode in SPECT scan.
4. Write the test for precision and Linearity for Radiation survey meter.
5. External factors affecting Gamma camera performance
6. Count rate capability
7. Field uniformity
8. Standardized uptake value and factors affecting SUV.

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

1. Energy resolution
2. FWTM
3. Test for a gamma zone monitor.
4. Ring artefact on CT image.
5. Contamination Monitor.
6. Pin source
7. Zero adjustment test.
8. Scintillation detector.
9. Linogram
10. FWHM and pixel size selection in SPECT.

****

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

[AHS 0122] JANUARY 2022 Sub. Code: 2123
(FEBRUARY 2021 & AUGUST 2021 EXAM SESSION)

B.Sc. NUCLEAR MEDICINE TECHNOLOGY
THIRD YEAR – (Regulation from 2010-2011)
PAPER III – QUALITY ASSURANCE IN NUCLEAR MEDICINE
Q.P. Code: 802123

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

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

1. Enumerate the acceptance tests during installation of gamma camera.
2. Draw a model of Nuclear Medicine Diagnostic Department plan and explain in respect of its public safety, contamination and in Quality Control.
3. Record maintenance that has to be done for radionuclide / radiopharmaceuticals in a nuclear medicine department with their significance.

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

1. Modulation transfer function.
2. Pulse height spectrometry.
3. Enumerate desirable qualities of PET scintillator.
4. What is time of light in PET?
5. Write the test for Volume response of the system in PET scan.
6. Describe the test for Photo Peak in SPECT scan.
7. Sinogram.
8. Constancy and accuracy test of Dose calibrator.

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

1. GM counter.
2. Dead time.
3. Liquid scintillation detector.
4. Thyroid uptake probe.
5. Resolution.
6. Whole body counter.
7. System sensitivity measurement formula.
8. Background counts.
9. Attenuation and scatter correction.
10. PLES phantom.

****

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

[AHS 0922] SEPTEMBER 2022 Sub. Code: 2123
(FEBRUARY 2022 & AUGUST 2022 EXAM SESSIONS)

B.Sc. NUCLEAR MEDICINE TECHNOLOGY
THIRD YEAR – (Regulation from 2010-2011)
PAPER III – QUALITY ASSURANCE IN NUCLEAR MEDICINE
Q.P. Code: 802123

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

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

1. Iso-response curve for flat field collimator and its significance.
2. Test to find the reliability of a radiation counting equipment.
3. COR Test and its significance on clinical image.

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

1. Tomographic uniformity.
2. Pixel size determination for a gamma camera.
3. Geometric / Volumetric variation of Dose calibrator.
4. System sensitivity for LEHR.
5. Procedure to test the dead time of a gamma camera.
6. Bulls eye artifact on SPECT image.
7. Differential Uniformity.
8. Explain how the half-life of a radionuclide is determined with the help of a dose Calibrator.

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

1. UFOV.
2. Signal Noise Ratio.
3. Extrinsic flood.
4. Intrinsic resolution.
5. Integral uniformity.
6. NEMA slit phantom.
7. Lead collimator.
8. Step wedge.
9. CDC Standard Precautions.
10. Necessary documents for licensing of a SPECT gamma camera facility.

****

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

[AHS 0424] **APRIL 2024** **Sub. Code: 2123**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY
THIRD YEAR – (Regulations 2010-2011 & 2018-2019 onwards)
PAPER III – QUALITY ASSURANCE IN NUCLEAR MEDICINE
Q.P. Code: 802123

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

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

1. Explain the general QA test procedures in scintillation and Gamma detectors.
2. Define flood check, linearity, uniformity, dead time, resolution for Gamma camera.
3. Outline the Steps to be followed for quality standard as per NABH (MIS) for Nuclear Medicine, with a model drawing for either PET-CT or SPECT or both.

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

1. Write about the Jaszczak phantom in respect of QA procedures.
2. Modulation transfer function.
3. Constancy and accuracy test of Dose calibrator.
4. Pulse height spectrometry.
5. Flood Field uniformity.
6. Write the test for Intrinsic/Extrinsic uniformity and sensitivity in SPECT scan.
7. COR test.
8. Procedure to test the dead time of a Gamma camera.

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

1. FWHM.
2. Test for a Gamma zone monitor.
3. Daily tests for a Gamma camera.
4. Liquid scintillation detector.
5. PLES phantom.
6. Whole body counter.
7. System sensitivity measurement formula.
8. Resolution.
9. Linogram.
10. Background counts.

****

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

[AHS 0125] **JANUARY 2025** **Sub. Code: 2123**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY
THIRD YEAR – (Regulations 2010-2011 & 2018-2019 onwards)
PAPER III – QUALITY ASSURANCE IN NUCLEAR MEDICINE
Q.P. Code: 802123

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

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

1. What is resolution of a Gamma Camera? Explain the various methods of testing the Resolution of the Gamma Camera.
2. What are the routine Quality Assurance Tests to be done in a PET-CT? Explain in detail about the various parameters to be tested periodically.
3. Describe in detail the various methods of determination of Radiochemical Purity of various Radiopharmaceuticals in the in-house Radiopharmacy laboratory and explain its significance.

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

1. Sensitivity of Gamma Camera.
2. Precautions necessary for handling Radioactivity.
3. Disposal of Radioactive Waste.
4. Tests to determine Filtration Integrity and Sterility of Radiopharmaceutical.
5. Routine checks to be conducted on Isotope Dose Calibrator.
6. Star Artifact.
7. High Performance Liquid Chromatography.
8. Practical difficulties in CT Based Attenuation Correction.

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

1. Dead Time of a Gamma Camera.
2. Time of Flight.
3. Basic Components of the Quality Assurance Tests in a Gamma Camera.
4. End of Warranty Tests in PET-CT.
5. FWHM.
6. Patient preparation for PET-CT.
7. QA of Phantoms in PET-CT.
8. Spatial Resolution of Gamma Camera.
9. Testing Pulse Height Analyzer Settings.
10. Importance of testing Flood Field Uniformity Testing in Gamma Camera.

****

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

[AHS 0425] **APRIL 2025** **Sub. Code: 2123**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY
THIRD YEAR – (Regulations 2010-2011 & 2018-2019 onwards)
PAPER III – QUALITY ASSURANCE IN NUCLEAR MEDICINE
Q.P. Code: 802123

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

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

1. AERB Procedure in e-Lora to obtain License of Operation for Nuclear Medicine facility with SPECT and PET camera with necessary diagram.
2. Describe Standard Operating Procedure (SOP) for preparation and dispensing of Radio-pharmaceuticals as per NABH standards for bone scan.
3. Role of Nuclear Medicine technologist cum Radiation Safety Officer (RSO) in maintaining quality standards in his/her department.

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

1. Types of survey and instruments used for various survey.
2. PET/CT acceptance test.
3. Factors affecting image quality in Gamma camera.
4. Draw neat diagram of dose calibrator and its application.
5. How will you behave with senior staff and ambulatory patients?
6. Registration and records of patients in the department.
7. Personnel management and punctuality.
8. Extrinsic and intrinsic uniformity with neat sketch.

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

1. AERB safety codes and guides.
2. Routine daily check of imaging rooms.
3. Bar phantom.
4. Decay time.
5. Energy spectrum of Tc-99m.
6. Constancy test.
7. Coincidence Detection in PET.
8. Define Quality Assurance (QA) and Quality Control (QC).
9. Storage of results.
10. Few factors affecting Standardized Uptake Value (SUV).

****

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

[AHS 1125] **NOVEMBER 2025** **Sub. Code: 2123**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY
THIRD YEAR – (Regulations 2010-2011, 2016-2017 & 2018-2019 onwards)
PAPER III – QUALITY ASSURANCE IN NUCLEAR MEDICINE
Q.P. Code: 802123

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

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

1. How to set-up a Nuclear Medicine lab? Explain with Layout diagrams.
2. Write briefly the Routine Daily Check Quality Control of Gamma camera, Dose Calibrator and uptake probe.
3. Enumerate the Acceptance Tests during installation of Gamma Camera.

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

1. System sensitivity for Low- Energy High-Resolution (LEHR).
2. Explain how the half-life of a radionuclide is determined with the help of a dose calibrator.
3. Necessary documents for licensing of a SPECT gamma camera facility.
4. Zero adjustment Test.
5. Center of Rotation (COR) calibrations in H and L mode in SPECT scan.
6. Field uniformity.
7. External factors affecting Gamma Camera performance.
8. What are the methods used in acquisition to optimize resolution in SPECT?

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

1. Various types of records maintained in Nuclear Medicine department.
2. Contamination Monitor.
3. Pin source.
4. Ring artefact on CT image.
5. Preventive maintenance service.
6. Tomographic resolution
7. Chi-square test
8. Dead time.
9. Useful Field of View (UFOV).
10. Geiger-Muller (GM) Counters.

****