

MANIPAL UNIVERSITY
SECOND YEAR M.Sc. NMT DEGREE EXAMINATION – JUNE 2015
SUBJECT: PAPER I: RADIO PHARMACY – II

Monday, June 01, 2015

Time: 10:00 – 13:00 Hrs.

Max. Marks: 80

✍ Answer ALL questions.

1. Write in short about the following:

- 1A. Safe practices during handling of radiopharmaceuticals
- 1B. Bacterial Endotoxin Test of Cold Kits
- 1C. Precautions during Paper Chromatography
- 1D. F-18 FLT synthesis

(5 marks × 4 = 20 marks)

✍ Answer the following:

2. Write in brief about any one PET radionuclide generator. (no details).
3. Describe Iodogen method of Iodination.
4. Describe chemisorption mechanism in radio pharmaceutical localization with examples.
5. What is lyophilisation of cold kit? Give a brief note on lyophiliser used in radio pharmacy cold lab. (No details).

(5 marks × 4 = 20 marks)

✍ Answer the following:

6. Describe the methods of production of N-13 Ammonia and C-11 CO₂.
7. Describe various methods of iodination with their merits and demerits.
8. Describe the indirect labeling method of antibodies with ^{99m}Tc.
9. Write about the factors to be considered for designing of newer radiopharmaceuticals.

(10 marks × 4 = 40 marks)



MANIPAL UNIVERSITY
SECOND YEAR M.Sc. N.M.T. DEGREE EXAMINATION – JUNE 2015
SUBJECT: PAPER II: NUCLEAR MEDICINE INSTRUMENTATION – II

Wednesday, June 03, 2015

Time: 10:00 – 13:00 Hrs.

Max. Marks: 80

✍ Answer ALL questions. Draw neat and labeled diagram as and when required.

1. To comment upon the performance characteristics of gamma ray spectrometer as a technologist what all tests should be performed? Explain.
(20 marks)
2. Elaborate the working principle of SPECT.
(20 marks)
3. What are the compensation methods for non-uniform attenuation?
(10 marks)
4. List the criteria for selection of gamma camera.
(10 marks)
5. **Write short notes on the following:**
 - 5A. Parallel hole collimator
 - 5B. SPECT vs. planar study
 - 5C. Co-registration of images
 - 5D. Smoothing filters

(5 marks × 4 = 20 marks)



MANIPAL UNIVERSITY**SECOND YEAR M.Sc. NMT DEGREE EXAMINATION – JUNE 2015****SUBJECT: PAPER IV: IMAGING NUCLEAR MEDICINE TECHNIQUES
(NEW REGULATIONS)**

Friday, June 05, 2015

Time: 10:00 – 13:00 Hrs.

Max. Marks: 80

Answer ALL questions:

1. A 2 year old female patient with left flank pain suspected of having pyelonephritis has come to your department for DMSA renal cortical scan. Discuss the

- 1A. Patient preparation
- 1B. Radio pharmaceutical preparation
- 1C. Acquisition protocol

(4+8+8 = 20 marks)

2. A 2 week old infant has come to your department with elevated conjugated bilirubin and pale coloured stools. As an ideal technologist what scan will you do for the same and also discuss the interpretation of the scintigraphy findings.

(20 marks)

3. Explain in detail the radiolabelling of antibodies and the procedure protocol for Radio Immuno Scintigraphy.

(20 marks)

4. Write short notes on:

- 4A. C-14 urea breath test
- 4B. Sentinel lymph node imaging
- 4C. ¹⁸F-FDG
- 4D. Left ventricular volume curve

(5 marks × 4 = 20 marks)



MANIPAL UNIVERSITY**SECOND YEAR M.Sc. NMT DEGREE EXAMINATION – JUNE 2015****SUBJECT: PAPER VI: RADIATION BIOLOGY AND RADIATION PROTECTION
(NEW REGULATION)**

Friday, June 12, 2015

Time: 10:00 – 13:00 Hrs.

Max. Marks: 80

- ✍ **Answer ALL the questions.**
✍ **Students are instructed to answer Section – A and Section – B on the separate answer paper.**

SECTION – A: RADIATION BIOLOGY (30 MARKS)

1. Briefly explain on the biological effects radiation on cells. (10 marks)
2. **Write short notes on following:**
- 2A. Hydrolysis of water
2B. Double and single strand break
2C. Hematologic Syndrome
2D. Compton effect
- (5 marks × 4 = 20 marks)

SECTION – B: RADIATION PROTECTION (50 MARKS)

3. **Answer the following:**
- 3A. Write briefly about the regulatory clearances required for the nuclear medicine practice.
3B. Explain stochastic and deterministic effect. (5 marks × 2 = 10 marks)
4. **Answer the following:**
- 4A. Explain briefly the gamma ray dosimeter.
4B. Write down safety precaution to be taken in I-131 ablation therapy. (20 marks × 2 = 40 marks)



MANIPAL UNIVERSITY**SECOND YEAR M.Sc. NMT DEGREE EXAMINATION – JUNE 2015****SUBJECT: PAPER III: NON IMAGING NUCLEAR MEDICINE TECHNIQUES
(NEW REGULATIONS)**

Monday, June 08, 2015

Time: 10:00 – 13:00 Hrs.

Max. Marks: 80

✍ **Answer ALL the questions.**

- 1A. Write Setting up the procedure and Clinical applications of the test performed for detection of bacterial metabolism radiometric system.
- 1B. Write the method for calculating Total Plasma Volume (TPV) using suitable radiolabel.
(10+10 = 20 marks)
2. Compare and contrast the IRMA with RIA. Describe about the setting up of a typical RIA assay. Why standards are required for assay?
(20 marks)
3. Describe the procedure which is used to confirm the presence of H Pylori.
(10 marks)
- 4A. Explain how good detection efficiency can be achieved when a sample is assayed in Liquid scintillation counter.
- 4B. Write short note on isoresponse curve of flat field collimator.
(10+5 = 15 marks)
- 5A. S-source Count rate: G-gross count rate; B-background count rate then derive the optimization of counting experiment.
- 5B. A standard NaI (Tl) well counter has a background counting rate of about 200cpm. The sensitivity of the well counter for I-131 is about 10^6 cpm/ μ Ci. What is the Minimum Detectable Activity for I-131 using 5 min counting measurement?
(5+5 = 10 marks)
6. Explain the basic assumption for compartment analysis in tracer kinetics.
(5 marks)



MANIPAL UNIVERSITY**SECOND YEAR M.Sc. NMT DEGREE EXAMINATION – JUNE 2015****SUBJECT: PAPER V: THERAPEUTIC NUCLEAR MEDICINE PROCEDURES
(NEW REGULATION)**

Wednesday, June 10, 2015

Time: 10:00 – 13:00 Hrs.

Max. Marks: 80

✍ Long answer questions.

1. Discuss the instructions (Pretherapy, during isolation, post discharge) to be given to a patient being planned for high dose radioiodine therapy.

(20 marks)

2. What are the ideal characteristics for a radionuclide /radiopharmaceutical for radiation synovectomy? Discuss any two agents. Write a small note on the development of newer pharmaceuticals / radionuclides for radiation synovectomy.

(20 marks)

3. A patient has been referred for ¹³¹I MIBG diagnostic scan. Discuss the preparation, scan protocol and the related precautionary instructions.

(20 marks)

4. Short notes:4A. Compare ⁸⁹Sr and ¹⁵³Sm4B. Waste disposal in ¹³¹I high dose "Isolation Ward".

4C. TLD

4D. Dose calibrator

(5 marks × 4 = 20 marks)

