

Question Paper

Exam Date & Time: 18-Jun-2024 (10:00 AM - 01:00 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

SECOND SEMESTER M.Sc. NMT DEGREE EXAMINATION - JUNE 2024
SUBJECT: NMT5201 - PET AND THERAPEUTIC RADIOPHARMACEUTICALS
(2021 SCHEME)

Marks: 100

Duration: 180 mins.

Answer all the questions.

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|-----|---|------|
| 1) | Discuss in detail F18-FDG synthesis and radiation handling procedures recommended for PET radiopharmaceuticals from synthesis to dose administration. | (20) |
| 2) | Discuss giving examples, ideal properties of PET diagnostic and therapeutic radiopharmaceuticals. | (20) |
| 3A) | Describe basic principles of C-11 labelling chemistry. | (10) |
| 3B) | Describe any two radionuclide therapies currently used in nuclear medicine? | (10) |
| 3C) | Discuss various quality control procedures recommended for PET radiopharmaceuticals. | (10) |
| 3D) | Discuss radiochemistry of Copper-64 (Cu-64) and use of any two Cu-64 based radiopharmaceuticals. | (10) |

4. Write short note:

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|-----|---|-----|
| 4A) | High performance liquid chromatography. | (5) |
| 4B) | PET vs SPECT radio-pharmacy. | (5) |
| 4C) | Radiopharmaceuticals used in bone palliation therapy. | (5) |
| 4D) | Lu-177 radioactive properties. | (5) |

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Question Paper

Exam Date & Time: 20-Jun-2024 (10:00 AM - 01:00 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

SECOND SEMESTER M.Sc. NMT DEGREE EXAMINATION - JUNE 2024

SUBJECT: NMT5202 - IMAGING PHYSICS

(2021 SCHEME)

Marks: 100

Duration: 180 mins.

Answer all the questions.

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|-----|---|------|
| 1) | Discuss in detail different methods of 3D image reconstruction in SPECT imaging. | (20) |
| 2) | Give detailed account on present and future of hybrid imaging in Nuclear Medicine. | (20) |
| 3A) | Discuss the Partial volume effect and its impact on the image quality. | (10) |
| 3B) | Discuss how positron physics is employed in Positron emission tomography. | (10) |
| 3C) | Discuss on factors affecting imaging quality in PET and mention methods to improve the image quality.
(5+5 = 10 marks) | (10) |
| 3D) | Discuss on the working of a rectilinear scanner. | (10) |
| 4A) | Write a short note on position logic circuit. | (5) |
| 4B) | What are true coincidences? | (5) |
| 4C) | Explain briefly principle of TOF-PET. | (5) |
| 4D) | Write a short note on semiconductor-based nuclear medicine imaging devices. | (5) |

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Question Paper

Exam Date & Time: 22-Jun-2024 (10:00 AM - 01:00 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

SECOND SEMESTER M.Sc. NMT DEGREE EXAMINATION - JUNE 2024
SUBJECT: NMT5203 - NUCLEAR MEDICINE PROCEDURE
(2021SCHEME)

Marks: 100

Duration: 180 mins.

Answer all the questions.

SECTION - A: DIAGNOSTIC NUCLEAR MEDICINE PROCEDURES (60 MARKS)

- 1) A bed ridden patient undergoing chemotherapy for breast cancer is referred to the department of Nuclear Medicine for bone scan. What is the rationale for the scan in this case? How would you perform the scanning procedure on this patient? (20)
(5+15 = 20 marks)
- 2A) Explain the rationale and uptake mechanism of the radiopharmaceuticals used in dementia imaging. (10)
- 2B) Which nuclear imaging procedure should be performed to differentiate biliary atresia from neonatal jaundice? Explain the rationale, procedure and interpretation. (10)
(5+5 = 10 marks)
- 2C) Describe the procedure for acquisition of Direct radionuclide cystogram (DRCG) scan. (10)
- 3A) Highlight pathophysiological features of Grave's disease and thyroiditis. (5)
(3+2 = 5 marks)
- 3B) Compare properties of radiopharmaceuticals used for lung ventilation imaging. (5)

SECTION B

Answer all the questions.

SECTION - B: THERAPEUTIC NUCLEAR MEDICINE PROCEDURES (40 MARKS)

- 4) Write in detail on Somatostatin receptors and their ligands. Discuss in brief the difference between diagnostic and therapeutic SSTR ligands. (20)
(12+8 = 20 marks)
- 5) Discuss in detail the mechanism of action of Lu-177 EDTMP for bone pain palliation. Discuss the procedure and post procedure care involved. (10)
(5+5 = 10 marks)
- 6A) Write a brief note on Bragg's ionization peak. (5)
- 6B) Write in brief, the therapeutic procedure involved in Y-90 transarterial radioembolization for HCC. (5)

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