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MANIPAL UNIVERSITY

SECOND YEAR B.Sc. N.M.T. DEGREE EXAMINATION – DECEMBER 2016

SUBJECT: RADIATION CHEMISTRY AND RADIATION PHYSICS

Thursday, December 15, 2016

Time: 10:00-13:00 Hrs.

Max. Marks: 80

- ✍ Answer Section – ‘A’ and Section – ‘B’ in two Separate Answer Books.
✍ Answer ALL questions.

SECTION – A : RADIATION CHEMISTRY : 30 MARKS

1. Write notes on following:

- 1A. Importance of Buffer solution
- 1B. Crystal formation
- 1C. Working principle of pH-meter
- 1D. Conjugated Acid Base Pair

(5 marks × 4 = 20 marks)

2. Write about Electrovalent, Covalent and Coordinate Covalent Bond formation with examples.
(10 marks)

SECTION – B : RADIATION PHYSICS : 50 MARKS

✍ Draw neat and labelled diagram as and when required.

1. Explain on the various radioactive equilibrium states.
(10 marks)
2. How are radionuclides produced? Explain on the mode by which ^{137}Cs is produced.
(10 marks)
3. How does charged particle interact with matter?
(10 marks)
4. Explain on the V-I curve of gas filled detectors.
(10 marks)

5. Write short notes of the following:

- 5A. Atom
- 5B. Preamplifier

(5 marks × 2 = 10 marks)



MANIPAL UNIVERSITY

SECOND YEAR B.Sc. N.M.T. DEGREE EXAMINATION – DECEMBER 2016

SUBJECT: RADIOPHARMACY – I

Friday, December 16, 2016

Time: 10:00-11:30 Hrs.

Max. Marks: 40

✍ Answer ALL questions.

1. Write short notes on:

- 1A. Basic Principle of radionuclide generator
- 1B. Diagnostic radiopharmaceuticals
- 1C. Safety precautions adopted for preparation of Tc^{99m} -Sulphur colloid
- 1D. Mention the mode of decay, production method, energy and half-life of the following radionuclides:

- i) Tc^{99m} ii) Mo^{99} iii) I^{131}

(5 marks \times 4 = 20 marks)

2. Define the radiochemical purity of a radiopharmaceutical. How do radiochemical impurities originate? Describe various methods of determining the radiochemical impurity in a radiopharmaceutical.

(10 marks)

3. Why Tc^{99m} is an indispensable radionuclide in nuclear medicine. State the oxidation states of Tc^{99m} in the following compounds:

- 3A. Tc^{99m} -DTPA
- 3B. Tc^{99m} -labeled albumin
- 3C. Tc^{99m} HIDA

(10 marks)



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MANIPAL UNIVERSITY

SECOND YEAR B.Sc. N.M.T. DEGREE EXAMINATION – DECEMBER 2016

SUBJECT: FUNDAMENTALS OF ELECTRONICS & NUCLEAR MEDICINE INSTRUMENTATION

Saturday, December 17, 2016

Time: 10:00-13:00 Hrs.

Max. Marks: 80

✍ Answer SECTION – A and SECTION – B in two separate answer books.

SECTION – A : FUNDAMENTALS OF ELECTRONICS : 30 MARKS

✍ Answer ALL the following questions.

✍ Draw suitable circuit diagram, block diagram, waveform or characteristics wherever it is necessary.

1A. Convert 27 and 48 into binary.

1B. Explain AND, NOR and Ex-OR gate.

(2+3 = 5 marks)

2A. Write a note on Inductor and Transistor.

2B. Briefly explain the voltage regulator.

(2+3 = 5 marks)

3A. Write a short note on ADC.

3B. Explain high pass filter.

(2+3 = 5 marks)

4A. Draw the symbol of op-amp and explain the symbol.

4B. Write a short note on pre-amplifier.

(2+3 = 5 marks)

5A. When we use the Role of UPS?

5B. Explain extrinsic semiconductor.

(2+3 = 5 marks)

6A. Write a short note on electronic noise.

6B. Explain the use of transistor.

(2+3 = 5 marks)

SECTION – B: NUCLEAR MEDICINE INSTRUMENTATION: 50 MARKS

✍ **Answer ALL the questions.**

1. Describe on different types of collimators used in Nuclear Medicine. (20 marks)
2. What are the QC tests to be done for a dose calibrator? (10 marks)
3. Explain the working principle and components of a PMT. (10 marks)
4. **Write short notes on:**
 - 4A. Activation centers in NaI(Tl) crystal
 - 4B. Dead time(5 marks × 2 = 10 marks)

