

MANIPAL UNIVERSITY**SECOND YEAR B.Sc. N.M.T. DEGREE EXAMINATION – JUNE 2012****SUBJECT: FUNDAMENTALS OF ELECTRONICS AND NUCLEAR MEDICINE INSTRUMENTATION**

Monday, June 11, 2012

Time: 10:00-13:00 Hrs.

Max. Marks: 80

- ✍ Answer SECTION – A and SECTION – B in two separate answer books.
✍ Draw suitable circuit diagram, block diagram, waveform or characteristics wherever it is necessary.

SECTION – A : FUNDAMENTALS OF ELECTRONICS : 30 MARKS

- ✍ Answer any SIX questions of the following.

1. Explain pre-amplifier. (5 marks)
- 2A. Write a short note on acceptor and donor in semiconductor.
2B. Explain p-n junction diode. (2+3 = 5 marks)
- 3A. Explain mathematical model of P.M.T.
3B. Explain comparator used in Nuclear Medicine. (2+3 = 5 marks)
4. Explain Op-Amp symbol and Inverting. (5 marks)
- 5A. Write about ADC.
5B. Explain series and parallel connection of resistor (2+3 = 5 marks)
- 6A. Write a short note on U.P.S.
6B. Explain full-wave rectifier (2+3 = 5 marks)
7. Write a short note on:
7A. Pulse shaping
7B. AND gate and OR gate. (2½+2½ = 5 marks)

SECTION – B: NUCLEAR MEDICINE INSTRUMENTATION: 50 MARKS

8. What is the significance of air conditioner in the Gamma Camera Room? How will you perform the routine quality control test on Gamma Camera?

(4+16 = 20 marks)

9. Why has Gamma Camera overruled Rectilinear Scanner?

(10 marks)

10. Write short notes on:

10A. Positioning and summation circuits.

10B. Spatial Resolution.

10C. LEHR Vs HEGP.

10D. Accuracy and Precision.

(5×4 = 20 marks)



MANIPAL UNIVERSITY
SECOND YEAR B.Sc. N.M.T. DEGREE EXAMINATION – JUNE 2012
SUBJECT: RADIATION CHEMISTRY AND RADIATION PHYSICS

Wednesday, June 13, 2012

Time: 10:00-13:00 Hrs.

Max. Marks: 80

✍ **Answer Section – ‘A’ and Section – ‘B’ In Two Separate Answer Books.**

SECTION – A : RADIATION CHEMISTRY : 30 MARKS

1. Write short notes on:

- 1A. Complexes and Chelates.
- 1B. Stable, Unstable and Metastable elements.
- 1C. Types of Chemical Reactions.
- 1D. Comparison of Ionic and covalent bond.
- 1E. Solute, Solvent and Solubility.
- 1F. Acid, Base and pH.

(5×6 = 30 marks)

SECTION – B : RADIATION PHYSICS : 50 MARKS

2. Answer the following:

- 2A. What are the different modes of decay? Explain alpha decay and isomeric transition.
- 2B. Explain pair production. Why pair production does require a minimum of 1.02 MeV energy?

(5×2 = 10 marks)

3. Answer the following:

- 3A. What are the three important modes of photon interaction with matter? Explain each process in detail.
- 3B. Discuss in detail about Liquid scintillation detectors.

(20×2 = 40 marks)



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MANIPAL UNIVERSITY

SECOND YEAR B.Sc. N.M.T. DEGREE EXAMINATION – JUNE 2012

SUBJECT: RADIOPHARMACY – I

Friday, June 15, 2012

Time: 10:00-11:30 Hrs.

Max. Marks: 40

✍ Answer all questions.

1. Write in short about the following:

- 1A. Ficks Principle of radiotracer kinetics.
- 1B. Shelf life and Stability of Radiopharmaceuticals.
- 1C. Special safety measures adopted during administration of Radiopharmaceuticals.
- 1D. Ideal properties of ^{99m}Tc for diagnostic use.

(5×4 = 20 marks)

2. Describe the steps for doing Ascending Paper chromatography of any given radiopharmaceutical. Define Retardation Factor (R_f) and Solvent Front(S_f) in chromatography. What are the precautions to be taken during the procedure?

(5+3+2 = 10 marks)

3. With neat and labeled diagram describe working principle of ^{99}Mo - ^{99m}Tc column type generator. What are the advantages over solvent extraction generator? How to calculate elution efficiency of the generator?

(5+3+2 = 10 marks)

