Reg. No.										

MANIPAL UNIVERSITY

SECOND YEAR B.Sc. N.M.T. DEGREE EXAMINATION – JUNE 2008

SUBJECT: FUNDAMENTALS OF ELECTRONICS AND NUCLEAR MEDICINE INSTRUMENTATION

Monday, June 09, 2008

Time: 3 Hrs. Max. Marks: 80

✍ **ANSWER SECTION – A AND SECTION – B IN TWO SEPARATE ANSWER BOOKS.**

SECTION – A : FUNDAMENTALS OF ELECTRONICS : 30 MARKS

✍ **Answer any SIX questions of the following.**

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

1A. Define Ohm's law and write the units of resistance and current.

1B. Write a short note on series and parallel connection of capacitor.

(2+3 = 5 marks)

2A. Explain energy band in solids.

2B. Explain extrinsic semiconductor.

(2+3 = 5 marks)

3A. Explain half-wave rectifier.

3B. Explain Charge sensitive pre-amplifier.

(2+3 = 5 marks)

4A. Explain mathematical model of P.M.T.

4B. Brief explanation about single channel analyzer.

(2+3 = 5 marks)

5A. Find the product of $(101101)_2 \times (101)_2$ and convert answer into decimal.

5B. Convert 23, 0.75 into binary and Add $(10111)_2 + (11111)_2$.

(2+3 = 5 marks)

6. Explain C.R.T.

(5 marks)

7A. Explain NAND gate.

7B. Write a short note on pulse shaping.

(2+3 = 5 marks)

SECTION – B: NUCLEAR MEDICINE INSTRUMENTATION: 50 MARKS

✍ **Answer all questions.**

8. Describe with diagram the principle of Rectilinear scanners.

(20 marks)

9. Explain the Principle and different components of a Gamma camera.

(20 marks)

10. Write short notes on:

10A. Radiation Survey Meters.

10B. Gas-Filled detector.

(5×2 = 10 marks)

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MANIPAL UNIVERSITY

SECOND YEAR B.Sc. N.M.T. DEGREE EXAMINATION – JUNE 2008

SUBJECT: RADIATION CHEMISTRY AND RADIATION PHYSICS

Tuesday, June 10, 2008

Time: 3 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. Electrolytes

1B. Hydrogen bond

1C. Atomic and molecular structure

1D. Spin quantum number

1E. Chemical reactions

1F. PH-Scale.

(5×6 = 30 marks)

SECTION – B : RADIATION PHYSICS : 50 MARKS

2. Answer the following:

2A. Derive the radioactive law of decay.

2B. Discuss photoelectric effect.

(5×2 = 10 marks)

3. Answer the following:

3A. i) Explain the construction and working of cyclotron.

ii) Write in detail about Compton process of interaction with matter.

(10+10 = 20 marks)

3B. Discuss in detail about Liquid scintillation detectors.

(20 marks)

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MANIPAL UNIVERSITY

SECOND YEAR B.Sc. N.M.T. DEGREE EXAMINATION – JUNE 2008

SUBJECT: RADIOPHARMACY – I

Wednesday, June 11, 2008

Time: 1½ Hrs. Max. Marks: 40

Answer all the questions. Draw neat and labeled diagram as and when required.

1. As a Radiopharmacist what are the radiation safety techniques you would adopt in your hot lab?

(10 marks)

2. As a Radiopharmacist do you justify the statement "Quality Check is a must for radiopharmaceuticals"? What are the various tests performed for the same?

(10 marks)

3. What are the production methods for neutron rich and proton rich radionuclides? Write a comparison note on the same.

(5 marks)

4. Solve the following:

4A. If the exposure from a source at a distance of 30cms is 25R/hr. What would be the exposure form the same source at 1m distance?

4B. If the HVT of a radioactive source is 5cms, what would be the TVT for the same?

(5 marks)

5. Write a short note on the following:

5A. Ultra short lived radionuclide generators.

5B. Radiolysis.

(5×2 = 10 marks)