Reg. No.										

MANIPAL UNIVERSITY

SECOND YEAR B.Sc. N.M.T. DEGREE EXAMINATION – JUNE 2007

SUBJECT: FUNDAMENTALS OF ELECTRONICS AND NUCLEAR MEDICINE INSTRUMENTATION

Thursday, June 07, 2007

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.**

1. The resistors of 45Ω and 67.5Ω are respectively connected in series across a source of 240V. Calculate: i) Circuit current ii) Voltage drop in each resister.

(5 marks)

2. Write a short note on pre-amplifier.

(5 marks)

3 Write a short note on PMT.

(5 marks)

4A. What is semiconductor? Name 2 semiconductors.
4B. Write a short note on working of p-n-p transistor.

(2+3 = 5 marks)

5. Explain AND and OR gate.

(5 marks)

6. Explain the OP-AMP giving its symbol and characterizes.

(5 marks)

7A. Convert 0.75, 19 into binary.
7B. Write a short note on p-type semiconductor.

(2+3 = 5 marks)

SECTION – B: NUCLEAR MEDICINE INSTRUMENTATION; 50 MARKS

✍ **Answer all questions.**

8. Describe the working principle of Rectilinear Scanner with the help of a block diagram.

(20 marks)

9. Write a detail note on Semiconductor detectors.

(20 marks)

10. Answer for any **TWO**:
10A. Multi Channel Analyzer.
10B. Photo Multiplier Tube.
10C. Dot factor and line spacing of Rectilinear Scanner.

(5×2 = 10 marks)

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MANIPAL UNIVERSITY

SECOND YEAR B.Sc. N.M.T. DEGREE EXAMINATION – JUNE 2007

SUBJECT: RADIATION CHEMISTRY AND RADIATION PHYSICS

Friday, June 08, 2007

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. Comparison of Hydrogen and Helium atoms

1B. pH

1C. Chelates and Complexes

1D. Stoichiometry

1E. Reversible and Irreversible reactions

1F. Valency and Oxidation state

(5×6 = 30 marks)

SECTION – B : RADIATION PHYSICS : 50 MARKS

2. Answer any **TWO**:

2A. Write about:

i) Isomer ii) Isotope iii) Isotone iv) Isobar v) Avagadro number

(1×5 = 5 marks)

2B. Explain stopping power and LET. Also give the difference between them.

(5 marks)

2C. i) Derive the relationship $A = A_0 e^{-\lambda t}$.

ii) How long does it take for 60% of a sample of I-131 to decay?

(5 marks)

3. Answer the following:

3A. What are the different modes of decay? Explain each mode with example.

(20 marks)

3B. i) Write about well type NaI(T1) Scintillation detectors.

ii) Write in brief about semiconductor detectors. What is its advantage over scintillation detectors? Also write about its limitations.

(10+10 = 20 marks)

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MANIPAL UNIVERSITY

SECOND YEAR B.Sc. N.M.T. DEGREE EXAMINATION – JUNE 2007

SUBJECT: RADIOPHARMACY-I
(NEW REGULATION)

Saturday, June 09, 2007

Time: 1½ Hrs. Max. Marks: 40

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

1. What are Generators? Define ultra short lived radionuclide generators and give atleast two examples for the same.

(10 marks)

2. Role of a Radiopharmacist in ^{99} Mo break through in ^{99m} Tc yield from a solvent extraction generator.

(10 marks)

3. A ^{99}Mo-^{99m} Tc generator of 500mCi (^{99}Mo) calibrated for the 12th at 8 hours had arrived in the department on the 10th. What would be the yield of technetium on the 11th and 12th at 9 hours (considering 80% yield and transient equilibrium has achieved)?

(5 marks)

4. If the exposure from a source at a distance of 15cms is 5R/hr. What would be the exposure from the same source at 1m distance?

(5 marks)

5. Write a short note on the following:

5A. Transient equilibrium

5B. Radioactive Waste Management

(5×2 = 10 marks)

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MANIPAL UNIVERSITY

SECOND YEAR B.Sc. N.M.T. DEGREE EXAMINATION – JUNE 2007

SUBJECT: RADIOPHARMACY
(OLD REGULATION)

Saturday, June 09, 2007

Time: 3 Hrs. Max. Marks: 80

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

1. "99mTc is a workhorse for Scintigraphy" Justify the following statement. Add a note on demerits of 131Iodine as an imaging agent.

(12+8 = 20 marks)

2. Describe the Group IIIA elements as radiopharmaceuticals.

(20 marks)

3. As a radiopharmacist justify the significance of Q.C. tests with illustrations write in detail on the radiochemical purity.

(20 marks)

4. Write short notes on any **FOUR**:

4A. Record keeping in Nuclear Pharmacy laboratories.

4B. Lymphoscintigraphy agents.

4C. Transchelation.

4D. Blood pool labeling.

4E. LAL test.

(4×5 = 20 marks)