MANIPAL ACADEMY OF HIGHER EDUCATION
(Deemed University)

SECOND YEAR B.Sc. N.M.T. DEGREE EXAMINATION –AUGUST 2006

SUBJECT: FUNDAMENTALS OF ELECTRONICS AND NUCLEAR MEDICINE INSTRUMENTATION
Monday, August 14, 2006

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 all questions.**

1. Explain the working principle of transformer.

2. Explain any one type of voltage regulator.

3. Explain single channel pulse height analyzer.

4. Explain intrinsic and extrinsic types of semiconductors.

5. Explain how an op-amp can be used for the following application with circuit diagram and expression.
5A. Integrator
5B. Voltage follower.

6. Define NAND, OR, EX-NOR gates. Draw the symbol and write truth table.

                                                                                            (5×6 = 30 marks)

SECTION – B: NUCLEAR MEDICINE INSTRUMENTATION: 50 MARKS

7. What are the Quality Control parameters of a scintillation camera?

                                                                                            (20 marks)

8. Describe working principle of rectilinear scanner with the help of block diagram.

                                                                                            (20 marks)

9. Answer for any **TWO**:
9A. 90° Quardant Bar Phantom.
9B. Parallel Hole Collimator.
9C. Flood Field Uniformity.

                                                                                            (5×2 = 10 marks)

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SECOND YEAR B.Sc. N.M.T. DEGREE EXAMINATION – AUGUST 2006

SUBJECT: RADIATION CHEMISTRY AND RADIATION PHYSICS
Wednesday, August 16, 2006

Time: 3 Hrs.   Max. Marks: 80

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

SECTION – A : RADIATION CHEMISTRY : 30 MARKS

1.   Answer briefly on any **SIX**:

1A.   Ionic bond.

1B.   Normality.

1C.   Acids.

1D.   pH.

1E.   Solvents.

1F.   Valency.

1G.   Rutherford Model of atomic structure.

(5×6 = 30 marks)

SECTION – B : RADIATION PHYSICS : 50 MARKS

2.   Answer any **TWO**:

2A.   Write about annihilation and pair production.

2B.   Write briefly about intrinsic efficiency and dead time of a detector.

2C.   Write about Cerenkov effect.

(5×2 = 10 marks)

3.   Answer the following:

3A.   Explain in detail the interaction of particulate radiation with matter.

(20 marks)

3B.   i)   Describe the method, which gives relatively neutron rich radionuclide. Also give the characteristics of the produced radionuclides.

ii)   Write in detail about compton effect.

(10+10 = 20 marks)