Reg. No.										

MANIPAL UNIVERSITY

SECOND YEAR B.Sc. N.M.T. DEGREE EXAMINATION – JUNE 2011

SUBJECT: FUNDAMENTALS OF ELECTRONICS AND NUCLEAR MEDICINE INSTRUMENTATION

Monday, June 06, 2011

Time: 14:00-17:00 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. Calculate the total capacitance of 3 capacitors of 10 μF, 20 μF and 30 μF are connected in series and also find total capacitance of these 3 capacitors connected in parallel.

(5 marks)

2. Write a short note on Multi Channel Analyzers in PHAs.

(5 marks)

3A. Explain UPS.

3B. Explain full wave rectifier.

(2+3 = 5 marks)

4. Explain transistor biasing.

(5 marks)

5. Define NAND, Ex-NOR gate, draw the symbol, truth table and equation.

(5 marks)

6. Write a short note on OP-AMP.

(5 marks)

7. **Write a short note on:**

7A. Atomic structure of semiconductor.

7B. Resistance in series.

(2½+2½ = 5 marks)

SECTION – B: NUCLEAR MEDICINE INSTRUMENTATION: 50 MARKS

8. **Give reasons for the following:**

8A. Usage of PMT in Gamma camera.

8B. Usage of position determining circuits in Gamma camera.

8C. Scalloping in Rectilinear scanner.

8D. The parallel hole collimator projects a gamma ray image of the same size as the source distribution on to the detector.

(5×4 = 20 marks)

9. Explain the various QC tests of a dose calibrator.

(20 marks)

10. **Write short notes on:**

10A. LEAP Collimator.

10B. Dead Time.

(5×2 = 10 marks)

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MANIPAL UNIVERSITY

SECOND YEAR B.Sc. N.M.T. DEGREE EXAMINATION – JUNE 2011

SUBJECT: RADIATION CHEMISTRY AND RADIATION PHYSICS

Wednesday, June 08, 2011

Time: 14:00-17:00 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. Decomposition and Combination reactions.

1B. Electrovalent and Covalent Bonds.

1C. Unstable elements.

1D. Colloids.

1E. Octet rule.

1F. Stoichiometry.

(5×6 = 30 marks)

SECTION – B : RADIATION PHYSICS : 50 MARKS

2. Answer the following:

2A. Explain pair production and annihilation.

2B. Define specific activity. Derive the equation for specific activity.

(5×2 = 10 marks)

3. Answer the following:

3A. What is scintillation? Write in detail about NaI(Tl) detector. Discuss the usefulness as well as the disadvantages of NaI(Tl) detector.

(20 marks)

3B. i) Explain the principle and working of Nuclear reactor.

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

(10+10 = 20 marks)