

**MANIPAL UNIVERSITY****THIRD YEAR B.Sc. N.M.T. DEGREE EXAMINATION – DECEMBER 2008****SUBJECT: IMMUNOLOGY, RADIOIMMUNOASSAY AND COUNTING STATISTICS**

Wednesday, December 10, 2008

Time: 10.00-13.00 Hrs.

Max. Marks: 80

- ✍ **Answer ALL the questions. Draw diagrams and flow charts wherever appropriate.**  
✍ **USE TWO SEPARATE ANSWER BOOKS FOR SECTION -'A' & SECTION -'B'.**

**SECTION – 'A': IMMUNOLOGY, RADIOIMMUNOASSAY: 70 MARKS****1. Write Short Notes on:**

- 1A. Complement fixation test.
- 1B. Basis of Antibody Specificity.
- 1C. Countercurrent and Rocket Electrophoresis.
- 1D. Type III Hypersensitivity.

(5×4 = 20 marks)

**2. Write Short notes on:**

- 2A. Principle of IRMA.
- 2B. Classification of Assays.
- 2C. Separation system in RIA.
- 2D. Recovery test.
- 2E. Equipments in RIA.
- 2F. ELISA.
- 2G. Data plotting in RIA.
- 2H. Low and High specific activity tracers.
- 2I. High dose Hook Effect.
- 2J. Sample Blank tubes.

(5×10 = 50 marks)

**SECTION – 'B': COUNTING STATISTICS: 10 MARKS****✍ Answer the following.**

3. What are the three types of measurement errors? Explain them.
- 4A. If the gross counting rate with source is  $R_g$  and background count rate is  $R_b$  calculate the % uncertainty in  $R_s$ .
- 4B. In 4 minute counting measurements, gross sample counts are 6000 and background counts are 4000. What is the net sample counting rate and its % uncertainty?

(5×2 = 10 marks)



## MANIPAL UNIVERSITY

THIRD YEAR B.Sc. N.M.T. DEGREE EXAMINATION – DECEMBER 2008

SUBJECT: RADIATION BIOLOGY AND IN VITRO NUCLEAR MEDICINE

Thursday, December 11, 2008

Time: 10.00-13.00 Hrs.

Max. Marks: 80

**SECTION – 'A' : RADIATION BIOLOGY : 30 MARKS****1. Answer all the questions:**

- 1A. Photoelectric Interaction.
- 1B. DNA structure.
- 1C. Concept of LD 50
- 1D. Human fetal irradiation.
- 1E. Linear threshold model
- 1F. Compton interaction

(5×6 = 30 marks)

**SECTION – 'B' : IN VITRO NUCLEAR MEDICINE : 50 MARKS****Answer all the questions.**

2. A patient suffering from excessive splenic sequestration of RBC (increased destruction of RBC in the spleen) has been referred to the department of nuclear medicine for the estimation of red cell survival. How will you calculate the RBC T<sub>1/2</sub> of this patient?

(15 marks)

3. In the insulin RIA the control sample value is 20 U/ml while the expected range is 50-75 U/ml and % Bmax/T is 25%. What do you infer? What will be the effect on the sample values?

(15 marks)

**4. Short notes:**

- 4A. C-11, C-14, C-13.
- 4B. Compartmental model.
- 4C. Dual isotope technique for Schilling's Test.
- 4D. Total Body sodium estimation.

(5×4 = 20 marks)



**MANIPAL UNIVERSITY****THIRD YEAR B.Sc. N.M.T. DEGREE EXAMINATION – DECEMBER 2008****SUBJECT: NUCLEAR MEDICINE INSTRUMENTATION**

Friday, December 12, 2008

Time: 10.00-13.00 Hrs.

Max. Marks: 80

**✍ Answer all questions:**

1. Explain various Q.C. tests for SPECT system.  
(20 marks)
2. Explain with diagram principle of Thyroid uptake probe. How it is useful in Nuclear Medicine Departments?  
(20 marks)
3. Explain Working principle of Medical Cyclotrons. Describe different Systems of a Medical cyclotron.  
(20 marks)
4. Write short notes on:
  - 4A. Liquid Scintillation Counters
  - 4B. Role of Filters in SPECT.
  - 4C. Magnetic Resonance Imaging (MRI).
  - 4D. Electrocardiogram (ECG)

(5×4 = 20 marks)



3

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**MANIPAL UNIVERSITY**

**THIRD YEAR B.Sc. N.M.T. DEGREE EXAMINATION – DECEMBER 2008**

**SUBJECT: RADIOPHARMACY – II**

Saturday, December 13, 2008

Time: 10.00-11.30 Hrs.

Max. Marks: 40

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1. What is the aim of designing a radiopharmaceutical? Briefly describe various fields to be studied in designing a new radiopharmaceutical.  
(2+8 = 10 marks)
  
2. What is the principle of the therapeutic radiopharmaceutical application? Mention the ideal characteristics of therapeutic radiopharmaceuticals. Add a note on  $^{131}\text{I}$  as a therapeutic radiopharmaceutical.  
(1+3+6 = 10 marks)
  
3. Write short notes on:
  - 3A. Radioxenon
  - 3B. Tumor imaging agents
  - 3C. Blood pool agents
  - 3D. Biodistribution studies.  
(5×4 = 20 marks)

