MANIPAL ACADEMY OF HIGHER EDUCATION
(Deemed University)
THIRD YEAR B.Sc. N.M.T. DEGREE EXAMINATION – JUNE 2006
SUBJECT: IMMUNOLOGY, RADIOIMMUNOASSAY AND MEDICAL STATISTICS
Wednesday, June 14, 2006

Time: 3 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: 50 MARKS

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

1A. Selective theory.

1B. Forces binding Antigen and Antibody.

1C. Immunoglobulin and receptors.

1D. Identical and partially identical Antigens.

1E. Migration inhibition test.

(5×4 = 20 marks)

2.   Write short notes on any **SIX**:

2A. Comparison between non isotopic and isotopic assays.

2B. Acceptance of RIA results.

2C. Equilibrium and non equilibrium assays.

2D. Problems in the initiation of IRMA.

2E. Microspot assays.

2F. 1251: and ideal in vitro radionuclide.

2G. Collection of RIA samples.

(5×6 = 30 marks)

SECTION – 'B': MEDICAL STATISTICS: 30 MARKS

3.   Which are the measures of central tendency? For the given data, find the value of each of them.

    8,   12,   2,   6,   8,   9,   4,   7,   11,   10

(1+4 = 5 marks)

4.   Certain pesticide is packed into bags by a machine. A random sample of 10 bags is drawn and their contents are found to weigh as follows:

    50,   49,   52,   44,   45,   48,   46,   45,   49,   45

Test if the average packing can be taken to be 50kg.

(Tabulated t $_{0.05}$ for 9 degree freedom = 2.262)

(5 marks)

5. Show that the coefficient of correlation is independent of scale and origin of the variables.

(5 marks)

6A. Define sensitivity and specificity.

6B. Calculate sensitivity in the following:

Test Result

	-	+
Well	836 = TN	44 = FB
III	26 = FN	94 = TP

(2½+2½ = 5 marks)

7A. How can we divide the total time for counting background counts and gross sample counts so as to have minimum error in the net count rate?

7B. Write down the general formula for the propagation of errors and derive the formula for the error propagation in multiplication of two data.

(5+5 = 10 marks)

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THIRD YEAR B.Sc. N.M.T. DEGREE EXAMINATION – JUNE 2006

SUBJECT: RADIATION BIOLOGY & INVITRO NUCLEAR MEDICINE
Thursday, June 15, 2006

Time: 3 Hrs.   Max. Marks: 80

✍   **Answer ALL the questions.**

SECTION – 'A' : RADIATION BIOLOGY: 30 MARKS

1. Describe the pathological consequences of ionizing radiation on mammalian bone.

2. Add a short note on the effect of ionizing radiation on human salivary glands.

3. Describe various types of interaction of radiation with matter.

4. What is LD_{50}? Describe how experimentally it is calculated.

5. Draw a typical shouldered *in vitro* mammalian cell survival curve and explain the parameters D_o, D_q **and N**. Briefly explain the various models of cell killing.

6. What are chromosome aberrations? Describe briefly with an illustrated diagrams.

$$(5×6 = 30 \text{ marks})$$

SECTION – 'B': INVITRO NUCLEAR MEDICINE: 50 MARKS

7. A male patient suffering from Iron deficiency anemia has been referred to the department of Nuclear Medicine for a ferrokinetic study to find out the cause of anemia. Write in details the patient preparation and the procedure protocol for
7A. Plasma iron clearance.
7B. Iron utilization.

$$(10+5 = 15 \text{ marks})$$

8. With a neat diagram explain the principles of RIA. How does RIA differ from IRMA?

$$(10+5 = 15 \text{ marks})$$

9. Write short notes on any **FOUR**:
9A. Detection of radiocarbon.
9B. Curve stripping.
9C. Blood volume estimation by radioisotope technique.
9D. RBC survival study.
9E. Total Body water estimation.

$$(5×4 = 20 \text{ marks})$$

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MANIPAL ACADEMY OF HIGHER EDUCATION
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THIRD YEAR B.Sc. N.M.T. DEGREE EXAMINATION – JUNE 2006

SUBJECT: NUCLEAR MEDICINE INSTRUMENTATION
Friday, June 16, 2006

Time: 3 Hrs.   Max. Marks: 80

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1. A new Gamma Camera that was bought for your department 6 months ago has to be used on patients for tomorrow. Describe your role for today.

(20 marks)

2. With a neat and labeled block diagram explain the principle and working of a thyroid uptake probe.

(20 marks)

3. Write in detail about the detector used in PET scanners.

(20 marks)

4. Write short notes on:

4A. COR.

4B. Fan beam collimators.

4C. Brute Force Technique.

4D. Attenuation Correction.

(5×4 = 20 marks)