MANIPAL UNIVERSITY

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

SUBJECT: IMMUNOLOGY, RADIOIMMUNOASSAY AND MEDICAL STATISTICS

Thursday, June 14, 2007

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. Monoclonal Antibody Production.

1B. Immunological tolerance.

1C. Precipitation reactions.

1D. Autoimmunity.

1E. Lymphocyte stimulation test.

(5×4 = 20 marks)

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

2A. Production of Antibodies.

2B. Auto analyzer In RIA.

2C. Principle of IRMA.

2D. Advantage of Logit Log graph in data processing.

2E. Systematic and random errors.

2F. High dose Hook effect.

2G. Fluoro immuno assays.

(5×6 = 30 marks)

SECTION – 'B': MEDICAL STATISTICS: 30 MARKS

3.   Mention the various graphs of frequency distribution. Differentiate between Bar diagram and Histogram.

(2½+2½ = 5 marks)

4A. Define standard deviation, variance and coefficient of variance.

4B. List the function and limitation of statistics.

4C. Define Chi-Square test of goodness of fit.

(1½+2½+1 = 5 marks)

5A. What is Spearman's rank correlation coefficient? Discuss its usefulness.

5B. Prove that Karl Pearson's correlation coefficient cannot exceed the limits I 1 i.e, $-1 \le r \ge 1$.

(5 marks)

6A. Define accuracy.

6B. Test Result

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

Calculate the accuracy.

($2\frac{1}{2}+2\frac{1}{2} = 5$ marks)

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

7B. What is the optimal division of a 10 minutes total counting time and the resulting uncertainty in the net sample counting rate, when the total counting rate (R_{s+b}) is 1875 cpm and background counting rate (R_b) is 15 cpm?

($5+5 = 10$ marks)

❀❀❀

MANIPAL UNIVERSITY

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

SUBJECT: RADIATION BIOLOGY AND INVITRO NUCLEAR MEDICINE

Friday, June 15, 2007

Time: 3 Hrs.   Max. Marks: 80

✍ **Answer ALL the questions.**

SECTION – 'A' : RADIATION BIOLOGY : 30 MARKS

1.   Write short notes on:

1A. Photoelectric Interaction.

1B. DNA structure.

1C. Concept of LD 50.

1D. Human fetal irradiation.

1E. Linear threshold model.

1F. Law of Bergonie and Tribondeau.

(5×6 = 30 marks)

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

2.   Justify the following statement: Monoclonal antibody production and two site IRMA technique are the building blocks of IRMA.

(15 marks)

3.   A patient suffering from excessive spleenic 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 T½ of this patient?

(15 marks)

4.   Short notes:

4A. Principles of Tracer techniques.

4B. Clinical application of radiometric detection system.

4C. Neutron activation analysis.

4D. Procedure for compartmental analysis.

(5×4 = 20 marks)

Reg. No. ☐☐☐☐☐☐☐☐☐☐☐

MANIPAL UNIVERSITY

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

SUBJECT: NUCLEAR MEDICINE INSTRUMENTATION

Saturday, June 16, 2007

Time: 3 Hrs.   Max. Marks: 80

✍ **Answer ALL the questions.**

1. What are the advantages of SPECT over planar imaging?

(20 marks)

2. With a neat and labelled diagram explain the differences between SPECT and PET instrumentation.

(20 marks)

3. The role of Nuclear Medicine Technologist is more responsible for SPECT imaging than that for planar imaging – justify. Add a note on the routine Q.C. tests to be done for SPECT systems.

(20 marks)

4. Write short notes on:

4A. Liquid Scintillation counters.

4B. Thyroid uptake probe.

4C. Photomultiplier tube.

4D. BGO detectors.

($5 \times 4 = 20$ marks)