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MANIPAL UNIVERSITY

THIRD YEAR B.Sc. N.M.T. DEGREE EXAMINATION – JUNE 2013

SUBJECT: IMMUNOLOGY, RADIOIMMUNOASSAY AND COUNTING STATISTICS

Tuesday, June 11, 2013

Time: 10:00-13:00 Hrs.

Max. Marks: 80

- ✍ Answer ALL the questions.
- ✍ Use same answer book for Section 'A' & Section 'B' and use separate answer book for Section 'C'.

SECTION – A: IMMUNOLOGY

1. Write about the specific and non-specific immunity. What are the biological functions of immunoglobulin?
2. Write short notes on:
 - 2A. Non Specific and Specific Immunity
 - 2B. Direct and Indirect Immunofluorescence

(10×2 = 20 marks)

SECTION – B: RADIOIMMUNOASSAY

- 3A. Compare between solid phase and liquid phase assay.
- 3B. Write short note on Monoclonal Antibodies.
4. Describe the importance of a tracer in RIA. Which one is the best tracer? State the reason(s).
5. Write about the systemic and random errors occurring in RIA. Also mention the reasons for the same.
6. Write about the nomenclature of different assays.
7. Compare and contrast between RIA and IRMA. Discuss about the problems in IRMA.

(10×5 = 50 marks)

SECTION – C: COUNTING STATISTICS

8. Define and explain propagation of errors.
9. Preliminary measurements in a sample counting procedure indicate gross and background counting rate of $R_g=900$ cpm $R_b = 100$ cpm respectively. Find optimal of a 1.25 minute total counting time and the resulting uncertainty in the net sample counting rate.

(5×2 = 10 marks)



MANIPAL UNIVERSITY**THIRD YEAR B.Sc. N.M.T. DEGREE EXAMINATION – JUNE 2013****SUBJECT: RADIATION BIOLOGY AND IN VITRO NUCLEAR MEDICINE**

Thursday, June 13, 2013

Time: 10:00-13:00 Hrs.

Max. Marks: 80

Answer all the questions.**SECTION – 'A' : RADIATION BIOLOGY : 30 MARKS****1. Write short notes on the following:**

- 1A. Law of Bergonie and Tribondeau
- 1B. Stages of Acute Radiation Syndromes
- 1C. Plasma iron clearance
- 1D. Stages of acute radiation syndrome
- 1E. Dose response models

(6×5 = 30 marks)

SECTION –'B': INVITRO NUCLEAR MEDICINE (50 MARKS)**2. Write short notes on the following:**

- 2A. Ideal characteristics of tracer for the estimation of blood volume
- 2B. Schilling test I
- 2C. Plasma iron clearance
- 2D. Solid phase assay and Liquid phase assay
- 2E. Separation system in RIA

(6×5 = 30 marks)

3. A female patient with a suspicion of H. Pylori infestation has been referred to the department of Nuclear Medicine for Carbon 14 breath test. Write on:

- 3A. Patient preparation
- 3B. Procedure Protocol
- 3C. Interpretation of the study
- 3D. Radioactive waste disposal for the same

(20 marks)



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MANIPAL UNIVERSITY

THIRD YEAR B.Sc. N.M.T. DEGREE EXAMINATION – JUNE 2013

SUBJECT: NUCLEAR MEDICINE INSTRUMENTATION

Saturday, June 15, 2013

Time: 10:00-13:00 Hrs.

Max. Marks: 80

✍ Answer **ALL** questions.

✍ Draw neat and labelled diagrams/circuits as and when required.

1. Explain the role, principle and acquisition parameters of SPECT used in Nuclear Medicine. (20 marks)
2. Explain on the detectors used in PET scanners. (20 marks)
3. Briefly explain whole body counters. (10 marks)
4. What are well counters? Write on their roles in Nuclear Medicine with reasons. (10 marks)
5. Write short note on the following:
 - 5A. Effect of scattered radiation in SPECT
 - 5B. NECR in PET
 - 5C. Ergometer
 - 5D. CT principle

(5×4 = 20 marks)



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MANIPAL UNIVERSITY

THIRD YEAR B.Sc. N.M.T. DEGREE EXAMINATION – JUNE 2013

SUBJECT: RADIOPHARMACY – II

Tuesday, June 18, 2013

Time: 10:00-11:30 Hrs.

Max. Marks: 40

✍ **Answer ALL questions.**

1. **Write in short about the following:**

- 1A. Characteristics of Iodine-125 and Iodine -131 radiopharmaceuticals
 - 1B. Comparison between Ga-citrate and In-111 labeled leukocyte imaging agents
 - 1C. Technetium labeled IDA radiopharmaceuticals
 - 1D. Mechanism of localization of radiopharmaceuticals by passive diffusion and phagocytosis
- (5×4 = 20 marks)

2. Classify and enlist the various brain imaging agents useful in the Nuclear Medicine. Explain any one radiopharmaceutical's preparation protocol biodistribution and quality control in detail.

(3+7 = 10 marks)

3. What is the aim of designing new radiopharmaceuticals? Write the factors which has to be considered for the designing of a new radiopharmaceutical.

(2+8 = 10 marks)

