

Reg. No.

MANIPAL UNIVERSITY

SECOND SEMESTER M.Sc. (MEDICAL RADIATION PHYSICS) DEGREE EXAMINATION – MAY/JUNE 2012

SUBJECT: RADIATION SOURCES AND RADIATION GENERATING EQUIPMENTS

Saturday, June 02, 2012

Time: 10:00 – 13:00 Hrs.

Max. Marks: 80

1. Answer the following questions:

1A. Discuss in detail about different types of filters used in X-ray tube.

(20 marks)

1B. Discuss in detail the Photo timer.

(20 marks)

1C. Discuss in detail about the construction and working of the following:

i) Cyclotron

ii) Microtron

(10+10 = 20 marks)

2. Write short notes on:

2A. Hooded anode tube

2B. Travelling wave acceleration

2C. Digital Subtraction Angiography

2D. Heel effect

(5×4 = 20 marks)



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SECOND SEMESTER M.Sc. (MEDICAL RADIATION PHYSICS) DEGREE EXAMINATION – MAY/JUNE 2012

SUBJECT: RADIATION DETECTION, MEASUREMENT AND INSTRUMENTATION

Tuesday, June 05, 2012

Time: 10:00 – 13:00 Hrs.

Max. Marks: 80

✍ Answer ALL questions.

1. Mention and discuss in detail two applications each for DC ion chamber and GM counters.
2. Explain in detail about Single Channel Analyzer and Multi Channel Analyzer.
3. Mention at least two chemical dosimeters and explain each one of them in detail as to how it is used for absorbed dose to water measurement.

(20×3 = 60 marks)

4. **Write short notes on:**

- 4A. Tissue equivalent survey meters
- 4B. Water phantom dosimetry system
- 4C. RIA counter
- 4D. Scintillation detectors

(5×4 = 20 marks)



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SECOND SEMESTER M.Sc. (MEDICAL RADIATION PHYSICS) DEGREE EXAMINATION – MAY/JUNE 2012

SUBJECT: RADIOBIOLOGY AND RADIOBIOLOGICAL BASIS OF RADIOTHERAPY

Thursday, June 07, 2012

Time: 10:00 – 13:00 Hrs.

Max. Marks: 80

 **Answer ALL questions.**

1. Write short notes on:

- 1A. Effect of radiation on eye and testes
- 1B. Concept of $LD_{50(30)}$
- 1C. Effect of radiation on cell cycle
- 1D. What is dose fractionation? Describe four 'R's of radiobiology in detail.

(5×4 = 20 marks)

2. Answer the following questions briefly:

- 2A. What is sub-lethal and potential lethal damage? Describe with illustrated examples.
- 2B. Give a detailed account of late effect of radiation in human.
- 2C. Describe in detail about the radiolysis of water.

(10×3 = 30 marks)

3. Answer the following questions in detail:

- 3A. What is the effect of radiation on macromolecules? Describe the effect of radiation on each of them with illustrated diagram.
- 3B. How ionizing radiation interacts with matter? Describe in detail.

(15×2 = 30 marks)



MANIPAL UNIVERSITY

SECOND SEMESTER M. Sc. M.R.P. DEGREE EXAMINATION – MAY/JUNE 2012 SUBJECT: RESEARCH METHODOLOGY AND BIO-STATISTICS

Tuesday, May 29, 2012

Time: 10:00 – 13:00 Hrs.

Max. Marks: 80

✍ **Answer ALL the questions.**

- 1A. Define mean, median, mode, standard deviation and coefficient of variation for 'n' observations.
- 1B. Explain stratified random sampling method. (5+5 = 10 marks)
2. Fifty patients with congestive heart failure were weighed before and after receiving a novel diuretic agent and the average weight loss (the difference between the two weights) for this sample was found to be 3.5 KG with a standard error of 2.6 Kg.
- 2A. Name the statistical test used for testing whether the agent is effective in reducing the weight.
- 2B. State the null and alternate hypothesis.
- 2C. Write the test statistic for this test.
- 2D. Mention the assumptions for the validity of this test.
- 2E. How do you take a decision on the acceptance or rejection of null hypothesis? (2×5 = 10 marks)
- 3A. What do you mean by sampling distribution and standard error? What are the factors that affect the width of a confidence interval for mean?
- 3B. Write a short note on binomial distribution. ((2+3)+5 = 10 marks)
4. What do you mean by randomization in randomised controlled trials (RCTs)? Explain different methods of randomization in RCTs. (1+9 = 10 marks)
- 5A. A hospital administrator wishes to estimate the mean weight of babies born in the hospital. How large a sample of birth records should be taken if the administrator wants a 95% confidence interval with margin error of 1.2 Kg? Assume that a reasonable estimate of the population standard deviation is 5 Kg.
- 5B. Write a short note on cross sectional study design. (5+5 = 10 marks)
6. Explain the structure of a research thesis. (10 marks)
7. **Write short notes on:**
- 7A. Chi square test
- 7B. Survival analysis
- 7C. Validity of a diagnostic test
- 7D. One way ANOVA (5×4 = 20 marks)



MANIPAL UNIVERSITY**SECOND SEMESTER M.Sc. (MEDICAL RADIATION PHYSICS)
DEGREE EXAMINATION – MAY/JUNE 2012****SUBJECT: RADIATION PHYSICS, RADIATION QUANTITIES AND UNITS**

Thursday, May 31, 2012

Time: 10:00 – 13:00 Hrs.

Max. Marks: 80

✍ **Answer ALL the questions.**

1A. Discuss interaction coefficient and its related units.

1B. Discuss in detail the vectorial radiometric quantities.

(10+10 = 20 marks)

2A. What is an exposure? Explain its measurement.

2B. Give the postulates of Bohr's atom model. Obtain an expression for the radius and energy of the nth orbit.

(10+10 = 20 marks)

3. Mention the main processes of interaction of x- rays and gamma rays with matter. Illustrate by means of a typical curve, the relative importance of these processes in different energy regions. How does the atomic cross section for these processes depend on the atomic number of the absorber?

(20 marks)

4A. Write a short note on cross section.

4B. Give the general equation for radioactive equilibrium. Explain secular equilibrium.

4C. Define specific activity. Derive an expression for the same.

4D. With the help of number – distance curve, define the quantities mean range, extrapolated range and straggling.

(5×4 = 20 marks)

