

MANIPAL UNIVERSITY**SECOND SEMESTER M.Sc. EXERCISE AND SPORTS SCIENCE / MSc MRP /
MSc MIT/ M.Sc. HHIA DEGREE EXAMINATION – JUNE 2016****SUBJECT: RESEARCH METHODOLOGY & BIOSTATISTICS / RESEARCH METHODOLOGY &
BIO-STATISTICS / BIOSTATISTICS / EPIDEMIOLOGY & BIOSTATISTICS**

Thursday, June 02, 2016

Time: 10:00 – 13:00 Hrs.

Max. Marks: 80

Answer ALL the questions.

- 1A. Explain the situation for use and computation procedure of mean and median.
- 1B. What is cluster sampling? Explain the procedure with example. List the advantages and disadvantages of this technique.
(5+5 = 10 marks)
- 2A. Suppose the ages at time of onset of a certain disease are approximately normally distributed with a mean of 12 years and a standard deviation of 3 years. A child has just come down with the disease. What is the probability that the child is:
- Between the ages of 9 and 12 years?
 - Over 15 years?
- 2B. Write a short note on Poisson distribution.
(5+5 = 10 marks)
- 3A. **Define the following terms:**
- Power of a test
 - P-value
 - Type one and type two errors in testing of hypothesis
- 3B. Describe with example the situation in which you would use independent sample t-test. What is the null hypothesis tested? List the assumptions.
((1+2+2) +5 = 10 marks)
- 4A. Differentiate parametric and non-parametric tests. Explain the situation for Kruskal-Wallis test.
- 4B. Write a short note on the application of Chi-square test.
(5+5 = 10 marks)
- 5A. A hospital administrator wishes to know what proportion of discharged patients is unhappy with the care received during hospitalization. How large a sample should be drawn if we let the error margin $d = 0.1$, the confidence coefficient is 0.95, and the anticipated percentage of unhappy patients is 30? (Given $Z_{1-\alpha/2} = 1.96$).
- 5B. Write a short note on Logistic Regression.
(5+5 = 10 marks)

6. Discuss Cohort study under:

6A. Basic design

6B. Basic features

6C. Basic steps

6D. Merits and demerits

(10 marks)

7. Explain the structure of a scientific research paper.

(10 marks)

8. **Write short notes on the following:**

8A. Randomized controlled trials

8B. Sensitivity and specificity of a diagnostic test

(5+5 = 10 marks)



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MANIPAL UNIVERSITY

SECOND SEMESTER M.Sc. (MEDICAL RADIATION PHYSICS) DEGREE EXAMINATION – JUNE 2016

SUBJECT: RADIATION PHYSICS, RADIATION QUANTITIES AND UNITS
(2011 SCHEME)

Saturday, June 04, 2016

Time: 10:00 – 13:00 Hrs.

Max. Marks: 80

- ✍ Answer ALL the questions.
- ✍ Draw diagrams wherever necessary.

1. Discuss in details interaction coefficients and Vectorial radiometric quantities. (20 marks)
2. When charged particles pass through matter, discuss types of interactions that takes place in the medium? (20 marks)
3. Discuss in detail Bragg – Gray principle and its corollaries. (20 marks)
4. **Write short notes on:**
 - 4A. Interaction of neutrons with matter
 - 4B. Thomson's Scattering
 - 4C. Bohr's Model
 - 4D. Radioisotopes used for therapy

(5 marks × 4 = 20 marks)



MANIPAL UNIVERSITY**SECOND SEMESTER M.Sc. (MEDICAL RADIATION PHYSICS)
DEGREE EXAMINATION – JUNE 2016****SUBJECT: RADIATION SOURCES AND RADIATION GENERATING EQUIPMENTS
(2011 SCHEME)**

Tuesday, June 07, 2016

Time: 10:00 – 13:00 Hrs.

Max. Marks: 80

- ✍ **Answer ALL the questions.**
✍ **Draw diagrams wherever necessary.**

1. Describe a typical isotope machine with the help of a neat diagram. (20 marks)

- 2A. Write in detail about the factors affecting Scatter radiation.
- 2B. Explain in detail the working of electron synchrotron and proton synchrotron. (10+10 = 20 marks)

3. Discuss in detail ratings of X-ray tubes. (20 marks)

4. **Write short notes on:**
 - 4A. High voltage circuit
 - 4B. Rotating Anode
 - 4C. Effects of filters on Patient exposures
 - 4D. Beam collimation and penumbra in Telecobalt unit(5 marks × 4 = 20 marks)



MANIPAL UNIVERSITY**SECOND SEMESTER M.Sc. (MEDICAL RADIATION PHYSICS)
DEGREE EXAMINATION – JUNE 2016****SUBJECT: RADIATION DETECTION, MEASUREMENT AND INSTRUMENTATION
(2011 SCHEME)**

Thursday, June 09, 2016

Time: 10:00 – 13:00 Hrs.

Max. Marks: 80

- ✍ **Answer ALL the questions.**
✍ **Draw diagrams wherever necessary.**

- 1A. Explain in detail about the design and operation of DC Ion chambers.
1B. Explain the method of measurement of X and Gamma exposure using ion chamber.
(10+10 = 20 marks)
2. Discuss in detail the characteristics of TLD phosphors.
(20 marks)
3. **Write in detail about:**
3A. The single channel analyzer
3B. The multichannel analyzer
(10+10 = 20 marks)
4. **Write short notes on:**
4A. Portable survey meters
4B. Scintillation detectors
4C. Secondary standard dosimeter
4D. Teletector
(5 marks × 4 = 20 marks)



MANIPAL UNIVERSITY

SECOND SEMESTER M.Sc. (MEDICAL RADIATION PHYSICS)
DEGREE EXAMINATION – JUNE 2016SUBJECT: RADIOBIOLOGY AND RADIOBIOLOGICAL BASIS OF RADIOTHERAPY
(2011 SCHEME)

Saturday, June 11, 2016

Time: 10:00 – 13:00 Hrs.

Max. Marks: 80

1. Answer the following questions.

- 1A. What are radiation induced sub-lethal and potentially lethal damage? Explain
- 1B. Write a short note on Compton effect and Pair production.
- 1C. Add a note on the effect of radiation on the cell cycle.
- 1D. What are the different types of ionizing radiation induced DNA damage? Explain the various mechanisms of DNA repair.

(5 marks \times 4 = 20 marks)

2. Answer the following questions briefly.

- 2A. Describe briefly the effect of ionizing radiation on Chromosomes.
- 2B. Define cell survival curve. Explain briefly the various parameters of *in vitro* derived mammalian cell survival curve.
- 2C. Describe the Gastrointestinal (GI) and Bone marrow (BM) syndrome.

(10 marks \times 3 = 30 marks)

3. Answer the following questions in detail.

- 3A. How ionizing radiation interacts with biological system? Describe the various phases of interaction and chemical reactions involved.
- 3B. What are Radiomodifiers? Describe in detail various classes of radioprotectors, their mechanisms of action and clinical significance.

(15 marks \times 2 = 30 marks)