MANIPAL UNIVERSITY

THIRD YEAR B.Sc. R.R.T. & D.T./B.Sc. C.V.T./B.Sc. M.R.T/B.Sc. R.T./B.Sc. M.L.T./ FOURTH YEAR B.O.T./B.P.T. DEGREE EXAMINATION – JUNE 2017

SUBJECT: BIOSTATISTICS & RESEARCH METHODOLOGY/RESEARCH METHODOLOGY & STATISTICS/BIOSTATISTICS/ BASIC BIOSTATISTICS & RESEARCH METHODOLOGY/RESEARCH METHODOLOGY AND BIOSTATISTICS

Thursday, June 01, 2017

Time: 10:00-13:00 Hrs.   Max. Marks: 80

✍ **Answer ALL the questions.**

1. List and define different types of variables.

(6 marks)

2. **Classify the following into the four different scales of measurement:**
2A. Stages of cancer
2B. Blood group
2C. Pain score (mild/moderate/sever)
2D. Age

(4 marks)

3. Thirty seven persons were examined for haemoglobin level in their blood (mg per dl). Construct a frequency polygon for the data.

Hb (mg/dl)	11 - 12	12 - 13	13 - 14	14 - 15	15 - 16	16 - 17
No. of persons	5	10	15	4	2	1

(4 marks)

4. Compute 65th percentile and standard deviation for the following data regarding weight of infants (in kg.).

2.32   2.36   2.89   3.03   3.86   2.90   4.01   3.69   3.07   2.87

(10 marks)

5. Data below shows the number of colonies of bacteria grown on ten agar plates. Calculate median and interquartile range.

60   70   100   160   140   80   110   95   130   115

(10 marks)

6. **Define the following:**
6A. Perinatal mortality rate
6B. Crude birth rate

(2+2 = 4 marks)

7. Describe correlation using scatter plots.

(6 marks)

8.   The amount of weight gained during pregnancy was assessed and was found to be approximately normally distributed with a mean weight gain of 12 kgs and a standard deviation of 4 kgs. Calculate the proportion of pregnant mothers who gained weight:

8A.   Less than 20 kgs

8B.   Between 12 to 16 kgs

8C.   At least 8 kgs

(2 marks × 3 = 6 marks)

9.   **Write short notes on:**

9A.   Reliability

9B.   Epidemiology and its aims

9C.   Systematic sampling

9D.   Characteristics of good hypothesis

9E.   Disease Registries

9F.   Case reports

(5 marks × 6 = 30 marks)

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MANIPAL UNIVERSITY

THIRD YEAR B. Sc. M.R.T. DEGREE EXAMINATION – JUNE 2017

SUBJECT: PRINCIPLES AND PRACTICE OF RADIOTHERAPY PART II
(2011 SCHEME)

Saturday, June 03, 2017

Time: 10:00 – 13:00 Hrs.   Max. Marks: 80

✍   **Answer ALL the questions:**

1.   How do you plan treatment for a patient of carcinoma of the cervix with radiotherapy?

(10 marks)

2.   Enumerate steps of Radiotherapy planning. What is Simulation and Verification in Radiotherapy?

(5+5 = 10 marks)

3.   Brief note on moulding materials in radiotherapy. Add a note on mould room.

(5+5 = 10 marks)

4A.   List the various Bolus Materials used in Radiotherapy.
4B.   Mention the use of any two of them in brief.

(6+4 = 10 marks)

5A.   Expand 3DCRT, IMRT.
5B.   Discuss in brief about 3DCRT.

(3+7 = 10 marks)

6.   How is CT Simulator different from a conventional simulator? Describe its role in treatment planning.

(5+5 = 10 marks)

7A.   What is a Gamma Knife?
7B.   Also add a note on Cyber(X) knife.

(5+5 = 10 marks)

8.   Compare Cesium-137 and Cobalt 60 as a Brachytherapy sources.

(10 marks)

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THIRD YEAR B.Sc. M.R.T. DEGREE EXAMINATION – JUNE 2017

SUBJECT: PHYSICS OF RADIOTHERAPY
(2011 SCHEME)

Tuesday, June 06, 2017

Time: 10:00-13:00 Hrs.   Max. Marks: 80

PART - A

1.   **Answer ALL the questions:**

1A.   Define R_{100}, R_{85}, R_{50} and R_p.

1B.   Define field flatness and symmetry.

1C.   Write the merits and demerits of a manual brachytherapy unit and after loading units.

1D.   Write short notes on reference points for dose prescription in Manchester System for Intracavitary applications.

1E.   Discuss about standing and travelling waveguides.

1F.   Write a short note on Portal Imaging.

(5 marks × 6 = 30 marks)

PART - B

2.   **Answer ALL of the following questions:**

2A.   Discuss about various beam modifying devices.

2B.   Describe the isotopes used for Brachytherapy. Why the use of Radium has been discontinued?

2C.   Write in detail about ICRU volumes.

2D.   Write in detail about field shaping in radiation therapy.

2E.   Define:

   i)   Percentage Depth Dose (PDD)

   ii)   Tissue Air Ratio (TAR)

   iii)   Tissue Maximum Ratio (TMR)

   iv)   Collimator scatter factor (S_c)

   v)   Phantom scatter factor (S_p)

(10 marks × 5 = 50 marks)

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THIRD YEAR B.Sc. M.R.T. DEGREE EXAMINATION – JUNE 2017

SUBJECT: RADIATION PROTECTION, STANDARDS AND REGULATIONS
(2011 SCHEME)

Thursday, June 08, 2017

Time: 10:00-13:00 Hrs.   Max. Marks: 80

✍ **Answer the following:**

1A. Write short note on deterministic effect.

1B. Discuss about the effects of radiation on cell.

(5+5 = 10 marks)

2. Write in detail about planning of a teletherapy room with a typical layout.

(10 marks)

3. Discuss different quality assurance tests to be performed on a brachytherapy unit.

(10 marks)

4. Write a note on Transport Index and Categories of Transport Containers for Radioactive Sources. Explain type A and type B radioactive packages.

(10 marks)

5A. Define HVL and TVL. Derive a relationship between HVL and TVL.

5B. The exposure rate from a Cs-137 source at a point is 100 mR/h. How much lead should be interposed between the source and the point so that exposure level could be brought down to 0.25 mR/h at this place? (HVL of Pb = 0.6 cm)

(5+5 = 10 marks)

6A. Write a short note on Acute exposure and Chronic exposure.

6B. What is the annual dose limits prescribed by ICRP for occupational and public exposure? Does this include the exposures due to natural background radiation and medical exposure?

(5+5 = 10 marks)

7. Write in detail about the duties of RSO.

(10 marks)

8. Explain about radiation hazard and evaluation.

(10 marks)