Reg. No.										

MANIPAL ACADEMY OF HIGHER EDUCATION

THIRD YEAR B.Sc. R.R.T. & D.T./ B.Sc. M.R.T/B.Sc. R.T./B.Sc. C.V.T FOURTH YEAR B.O.T./B.P.T. DEGREE EXAMINATION – JUNE 2018

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

Friday, June 01, 2018

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

✍ **Answer ALL the questions.**

1. Define statistics and enumerate its applications in health sciences.

(5 marks)

2. Form a frequency table along with relative frequencies for the ages of 40 patients given below. (Class intervals: 0 – 15, 15 – 30, 30 – 45, so on)

57	37	43	43	30	39	53	47	64	31
40	22	40	29	15	65	39	43	54	40
24	46	17	38	50	30	34	25	36	39
36	62	30	07	47	32	36	42	42	47

(5 marks)

3. Define discrete and continuous variables with examples.

(4 marks)

4. **State true or false:**

4A. Mode may or may not exist.

4B. Standard normal curve is either leptokurtic or platykurtic.

(2 marks)

5. Construct a bar diagram for the following data on socioeconomic status of 120 HIV infected subjects.

Socioeconomic Status	No. of subjects
High	55
Middle	25
Low	40

(4 marks)

6. Erythrocyte Sedimentation Rate (ESR) readings (in mm) of 10 tuberculosis patients are given below. Calculate coefficient of variation.

11 9 8 14 10 8 7 12 8 9

(10 marks)

7. Obtain median and interquartile range for the data regarding number of post operative days until diagnosis of infection for each subject experiencing an infection.

7 4 15 8 16 14 8 9 12 11

(8 marks)

8. **Define the following:**

8A. Crude death rate
8B. Total fertility rate
8C. Maternal mortality rate

(2 marks × 3 = 6 marks)

9. Given the weight of new born babies is approximately normally distributed with a mean of 3000 gms and a standard deviation of 300 gms, obtain the proportion of new born babies with weight

9A. More than 3300 gms
9B. Between 3000 and 3600 gms

(3 marks × 2 = 6 marks)

10. **Write short notes on:**

10A. Scatter diagram
10B. Probability sampling
10C. Case series study
10D. Health information system
10E. Disease registries
10F. Scales of measurement

(5 marks × 6 = 30 marks)

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MANIPAL ACADEMY OF HIGHER EDUCATION

THIRD YEAR B. Sc. M.R.T. DEGREE EXAMINATION – JUNE 2018

SUBJECT: PRINCIPLES AND PRACTICE OF RADIOTHERAPY PART II

(2011 SCHEME)

Monday, June 04, 2018

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

Answer ALL the questions:

1. How is a patient with cervical cancer planned for radiotherapy immobilized? Write on the commonly employed technique of external beam radiotherapy.

(10 marks)

2. Outline the management of a patient with locally advanced esophageal cancer.

(10 marks)

3. What are the common presenting complaints of a patient with bladder cancer? Explain the role of radiotherapy in bladder preservation.

(10 marks)

4. What are the risk factors for the development of breast cancer? Write in brief on the signs and symptoms of breast cancer.

(10 marks)

5. Write the different organs at risk encountered in the planning of a patient with pelvic tumor. Write their tolerance doses.

(10 marks)

6. Discuss about the making of a shielding blocks and materials used.

(10 marks)

7A. Write a short note on bolus materials used in radiotherapy.

7B. Compare Cobalt–60 and Cesium–137 as Brachytherapy sources.

(5+5 = 10 marks)

8. What are the principles of IMRT? Write in brief of multi leaf collimators.

(10 marks)

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MANIPAL ACADEMY OF HIGHER EDUCATION

THIRD YEAR B.Sc. M.R.T. DEGREE EXAMINATION – JUNE 2018

SUBJECT: PHYSICS OF RADIOTHERAPY

(2011 SCHEME)

Wednesday, June 06, 2018

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

1. **Answer all the questions.**

1A. Define TAR and TMR with neat diagram.

1B. Write a short note on magnetron.

1C. Explain SSD and SAD technique for parallel opposed beams using a neat pictorial representation.

1D. How will you find an equivalent square field for the given rectangular field? What is the equivalent square of 10 x 25 cm^2?

1E. Write a short note on EPID.

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

(5 marks × 6 = 30 marks)

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

2A. Define PDD and explain in detail the various factors it depends on.

2B. Write about the general guidelines of Patient positioning in external beam therapy.

2C. Write in detail about Cobalt 60 Teletherapy unit.

2D. Write in detail about beam modifying devices used in radiotherapy.

2E. Define:

i) Percentage depth dose
ii) Tissue Air Ratio
iii) Backscatter factor
iv) Tissue phantom ratio
v) Tissue maximum ratio

(10 marks × 5 = 50 marks)

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MANIPAL ACADEMY OF HIGHER EDUCATION

THIRD YEAR B.Sc. M.R.T. DEGREE EXAMINATION – JUNE 2018

SUBJECT: RADIATION PROTECTION, STANDARDS AND REGULATIONS

(2011 SCHEME)

Friday, June 08, 2018

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

✍ **Answer the following:**

1A. Write briefly about natural background radiation.

1B. Compare the use of Film badge, TLD and Pocket dosimeter for personnel monitoring.

(5+5 = 10 marks)

2A. Write briefly about shielding in control of external radiation hazard. If the intensity of radiation from a point source of Cs – 137 is 100 mR/hr, how much lead will be required to reduce the radiation level to 5mR/hr? (HVL = 0.8 cm)

2B. Write a short note on marking and labelling of a radioactive package.

(5+5 = 10 marks)

3. **Define:**

a) KERMA b) Exposure c) Absorbed dose d) Effective dose

(10 marks)

4A. Write briefly about Type A and Type B radioactive package.

4B. Write the relationship between HVL and Intensity as well HVT and TVT.

(5+5 = 10 marks)

5. Discuss the different daily quality assurance tests to be performed on LINAC.

(10 marks)

6. Write in detail about planning of a Brachytherapy room with a typical layout.

(10 marks)

7. Explain the system of radiological protection. Mention the recommended dose limits for both occupational workers and public.

(10 marks)

8A. Discuss about the effects of radiation on cell.

8B. Lead containers are not recommended for storing pure beta emitters. Why? What is the general procedure for storing such sources?

(10 marks)