MRP

Reg. No.										

MANIPAL UNIVERSITY

SECOND SEMESTER M.Sc. CLINICAL PSYCHOLOGY/M.Sc. EXERCISE AND SPORTS SCIENCE/M.Sc. MRP/M.Sc. HHIA DEGREE EXAMINATION – JUNE 2015

SUBJECT: ADVANCED BIOSTATISTICS & RESEARCH METHODOLOGY / RESEARCH METHODOLOGY & BIOSTATISTICS / RESEARCH METHODOLOGY & BIOSTATISTICS (2011 SCHEME)/EPIDEMIOLOGY & BIOSTATISTICS (2013 SCHEME)

Monday, June 15, 2015

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

✍ **Answer ALL the questions.**

1A. Define standard deviation. Explain the computation with example.

1B. What is systematic sampling? Explain the procedure with an example. List the advantages and disadvantages of this technique.

(5+5 = 10 marks)

2A. Suppose the low-density lipoprotein (LDL) cholesterol level of women aged 30-40 years are approximately normally distributed with a mean of 130 mg/dL and a standard deviation of 6mg/dL. A woman has just come down for LDL test. What is the probability that the woman's LDL level is:

i) Between the ages of 124 and 136 mg/dL?

ii) Over 136 mg/dL?

2B. Write a short note on Poisson distribution.

(5+5 = 10 marks)

3. Define the following terms:

3A. i) Level of significance

ii) P-value

iii) Null and Alternative 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 Mann-Whitney U test.

4B. Explain with example the computation procedure of Chi-square test statistic.

(5+5 = 10 marks)

5A. A random sample of 80 adults of 50+ age group individuals from a population contained 20 subjects with hypertension. Construct 95% confidence interval for the population prevalence of hypertension. (Given Z $1-\alpha/2=1.96$).

5B. Write a short note on logistic regression.

(5+5 = 10 marks)

6. Discuss Randomized Controlled trial under:

6A. Basic Design

6B. Basic features

6C. Basic steps

6D. Merits and demerits

(10 marks)

7. Explain the use and structure of a research protocol.

(10 marks)

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

8A. Cohort study

8B. Sensitivity and specificity of a diagnostic test

(5+5 = 10 marks)

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SECOND SEMESTER M.Sc. (MEDICAL RADIATION PHYSICS) DEGREE EXAMINATION – JUNE 2015

SUBJECT: RADIATION PHYSICS, RADIATION QUANTITIES AND UNITS

(2011 SCHEME)

Wednesday, June 17, 2015

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

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

1. Derive the general equation for radioactive equilibrium. Explain secular equilibrium and transient equilibrium.

(20 marks)

2A. Derive an expression for the change in wavelength of a scattered photon and the energy of the recoil electron.

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. Discuss in detail interaction of particulate radiation with matter.

(20 marks)

4. **Write short notes on**:

4A. Committed dose and dose co-efficient

4B. Beta decay with example

4C. Radiation weighting factor

4D. Half life and Mean life

(5 marks × 4 = 20 marks)

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MANIPAL UNIVERSITY

SECOND SEMESTER M.Sc. (MEDICAL RADIATION PHYSICS) DEGREE EXAMINATION – JUNE 2015

SUBJECT: RADIATION SOURCES AND RADIATION GENERATING EQUIPMENTS (2011 SCHEME)

Friday, June 19, 2015

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

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

1. Discuss in detail the electron Linear Accelerator with neat diagram.

(20 marks)

2. Discuss in detail the circuits connected to Autotransformer.

(20 marks)

3. Discuss in detail the Photo timer.

(20 marks)

4. **Write short notes on:**

4A. Role and typical properties of flattening filters in LINAC

4B. Mammography X-ray tube

4C. Geometric penumbra in Telecobalt machine

4D. Hooded anode tube

(5 marks × 4 = 20 marks)

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MANIPAL UNIVERSITY

SECOND SEMESTER M.Sc. (MEDICAL RADIATION PHYSICS) DEGREE EXAMINATION – JUNE 2015

SUBJECT: RADIATION DETECTION, MEASUREMENT AND INSTRUMENTATION (2011 SCHEME)

Monday, June 22, 2015

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

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

1A. Explain the principle of thermo luminescence dosimeters with energy diagrams.

1B. Write short notes on Glow curves of TL materials and Photon energy dependence of TLD.

(10+(5+5) = 20 marks)

2. Explain in detail about the construction, the discharge mechanism and the quenching agents of the G.M counter.

(20 marks)

3. What is personal monitoring? Explain the different types of personal monitors.

(20 marks)

4. **Write short notes on:**

4A. Liquid scintillation counting system

4B. Gamma area monitors

4C. Multi-Channel Analyzer

4D. Radiation Field Analyzer

(5 marks × 4 = 20 marks)

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MANIPAL UNIVERSITY

SECOND SEMESTER M.Sc. (MEDICAL RADIATION PHYSICS) DEGREE EXAMINATION – JUNE 2015

SUBJECT: RADIOBIOLOGY AND RADIOBIOLOGICAL BASIS OF RADIOTHERAPY

(2011 SCHEME)

Wednesday, June 24, 2015

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

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1. **Answer the following questions:**

1A. Discuss the consequences of radiation exposure to skin.

1B. What is the effect of radiation on DNA?

1C. Discuss compton effect.

1D. Write short note on Genetically significant dose (GSD).

(5 marks × 4 = 20 marks)

2. **Answer the following questions briefly:**

2A. With a neat labelled diagram, describe the ultra-structure of an eukaryotic cell. Add note on the function of different organelles.

2B. What are radioprotectors? Describe the various types of radioprotectors and their clinical significance.

2C. What is dose fractionation? Describe 4 'R's of radiobiology in detail.

(10 marks × 3 = 30 marks)

3. **Answer the following questions in detail:**

3A. Discuss the effect of radiation on water.

3B. What are the major differences between bacterial and mammalian cell survival curves? Describe briefly mammalian cell survival curve.

(15 marks × 2 = 30 marks)