

# MANIPAL UNIVERSITY

**PG DIPLOMA IN NUCLEAR MEDICINE TECHNOLOGY EXAMINATION – JUNE 2016**

**SUBJECT: BIOSTATISTICS AND RESEARCH METHODOLOGY AND ADVANCES IN NUCLEAR MEDICINE**

Wednesday, June 01, 2016

Time: 10:00-13:00 Hrs.

Max. Marks: 80

☞ Use two separate answer books for SECTION 'A' & SECTION 'B'.

## SECTION – A: BIOSTATISTICS AND RESEARCH METHODOLOGY (40 MARKS)

1. Define infant mortality rate and perinatal mortality rate. (4 marks)
  
2. Categorize the following based on the scales of measurement (Nominal, Ordinal, Interval and Ratio)
  - i) Systolic Blood Pressure      ii) Pain Score (mild/moderate/severe)(2 marks)
  
3. Given that the height of males is approximately normal distributed with a mean of 70 inches and SD of 3 inches. What percent of males are taller than or equal to 73 inches? (2 marks)
  
4. **Write a short note on:**
  - 4A. Stratified sampling
  - 4B. Case series and Case report(5 marks × 2 = 10 marks)
  
- 5A. The following data provides hemoglobin level of 15 patients who visited a clinic. Calculate coefficient of variation.
 

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| 12 | 15 | 13 | 19 | 17 | 11 | 15 | 14 | 12 | 16 | 19 | 15 | 09 | 13 | 10 |
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- 5B. Obtain the 60th percentile and 7th decile for the data on percent of fluid recovered among antigen challenged sites following bronchoalveolar lavage (BAL) in asthmatic patients  
64 25 70 35 43 49 62 56 43 66
  
- 5C. Obtain the median and the interquartile range for the data given below regarding the number of days of hospital stay for cardiac patients.

|    |    |    |    |    |    |    |    |    |    |
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| 16 | 24 | 33 | 32 | 12 | 24 | 34 | 21 | 24 | 31 |
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(8+6+8 = 22 marks)

SECTION – B: ADVANCES IN NUCLEAR MEDICINE (40 MARKS)

 **Answer ALL questions.**

1. Write notes on cyclotron produced radioisotopes used in Nuclear Medicine with atleast one application on each isotope.

(20 marks)

2. Explain the various compartmental models.

(20 marks)



## MANIPAL UNIVERSITY

PG DIPLOMA IN NUCLEAR MEDICINE TECHNOLOGY EXAMINATION – JUNE 2016

SUBJECT: CLINICAL NUCLEAR MEDICINE TECHNIQUES

Friday, June 03, 2016

Time: 10:00-13:00 Hrs.

Max. Marks: 80

✍ Answer ALL the questions.

1. A four year old patient with neuroblastoma is referred to nuclear medicine department for the evaluation of bone metastasis. Write about the:
- Radiopharmaceutical preparation
  - Dose administered
  - Patient preparation pre and post injection
  - Acquisition parameters

(5+2+8+5 = 20 marks)

2. A 60 year old man underwent splenectomy two years ago. The patient continues to have thrombocytopenia. The patient was referred to NM department to rule out the presence of residual/accessory splenic tissue. In detail describe procedure you will opt for along with radiopharmaceutical preparation and procedure protocol.

(20 marks)

3. Describe the Gates protocol for estimation of glomerular filtration rate. How will you perform a renogram study using  $Tc^{99m}$ -DTPA?

(20 marks)

4. Write short notes on:

- Radioactive radioiodine uptake
- Patient preparation for  $I^{131}$  MIBG Scan
- Bone marrow Imaging
- CSF leak

(5 marks  $\times$  4 = 20 marks)



**MANIPAL UNIVERSITY****PG DIPLOMA IN NUCLEAR MEDICINE TECHNOLOGY EXAMINATION – JUNE 2016****SUBJECT: THERAPEUTIC NUCLEAR MEDICINE PROCEDURES**

Monday, June 06, 2016

Time: 10:00-13:00 Hrs.

Max. Marks: 80

✍ **Answer ALL questions.**

✍ **Long questions:**

1. A female patient suffering from thyrotoxicosis is taking Tab. Neomercazole and has been referred to Nuclear Medicine for I-131 therapy. How will you proceed?  
(20 marks)
2. A patient has been referred for 131-I MIBG therapy. Discuss the preparation, scan protocol, and the related precautionary instructions.  
(20 marks)
3. List four radiopharmaceuticals with their properties which can be used for radiosynovectomy.  
(20 marks)
4. **Write short notes on:**
  - 4A. HVT and TVT
  - 4B. Personnel monitoring
  - 4C. Precautions to be taken after discharge by patients of high dose 131-I therapy
  - 4D. Lead and Tungsten

(5 marks × 4 = 20 marks)



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## MANIPAL UNIVERSITY

### PG DIPLOMA IN NUCLEAR MEDICINE TECHNOLOGY EXAMINATION – JUNE 2016 SUBJECT: HEALTH PHYSICS AND RADIATION PROTECTION

Wednesday, June 08, 2016

Time: 10:00-13:00 Hrs.

Max. Marks: 80

1. **Answer any FOUR of the following questions:**

- 1A. Explain stochastic and deterministic effects.
- 1B. Define Equilibrium absorbed dose constant and absorbed fraction.
- 1C. A patient was administered with 25 mCi  $^{99m}\text{Tc}$ -MDP. Activity content of bladder was found to be 45% with biological half-life of 3 hrs. What is the dose received by thyroid from the bladder?  $S(\text{bladder} \leftarrow \text{thyroid}) = 9.8\text{E} - 7 \text{ rad} / \mu\text{Ci} - \text{hr}$
- 1D. Write a short note on radioactive packages, Tissue Weighting Factor.
- 1E. Define HVL and TVL. How many HVLs make one TVL? Where does one use this concept in radiation protection?

(5 marks  $\times$  4 = 20 marks)

2. **Answer ALL the questions.**

- 2A. What are radiation emergencies, causes and its management?  
(20 marks)
- 2B. i) Describe in detail the procedure for monitoring contamination and decontamination.  
ii) ICRP recommendation of annual dose limits.  
(10+10 = 20 marks)
- 2C. What are the aims and cardinal principles of radiation protection with examples.  
(20 marks)

