

**MANIPAL UNIVERSITY**

**FIRST YEAR BOT / B.Sc. MLT / B.Sc. CVT / B.Sc. MIT / B.Sc. RT / B.Sc. NMT /  
B.Sc. RRT & DT / B.Sc. MRT / DEGREE EXAMINATION – AUGUST 2015**

**SUBJECT: PHYSIOLOGY**

Thursday, August 27, 2015

Time: 10.00 – 11.30 Hours.

Max. Marks: 40

**✍ Answer ALL questions. Draw diagrams and flow chart wherever appropriate.**

**1. Essay Questions:**

- 1A. Explain the intrinsic mechanism of blood clotting.
- 1B. Draw and label a normal electrocardiogram from limb lead II and mention the causes for each wave.
- 1C. Mention any three functions of cerebellum. List any two features of cerebellar lesion.
- 1D. List four actions of thyroid hormones. Name the condition that results due to deficiency of thyroid hormones in adults.

(5 marks × 4 = 20 marks)

**2. Short Answer Questions:**

- 2A. Describe rigor mortis
- 2B. Describe primary active transport mechanism with an example
- 2C. List two features of erythroblastosis fetalis
- 2D. What are the two different forms of carbon dioxide transport in blood?
- 2E. Define cardiac output. Mention its normal value
- 2F. Name the components of vestibular apparatus
- 2G. List any two functions of liver
- 2H. Mention any two actions of testosterone
- 2I. Define glomerular filtration rate. Give its normal value
- 2J. Mention two properties of sensory receptors

(2 marks × 10 = 20 marks)



# MANIPAL UNIVERSITY

**FIRST YEAR B.Sc. N.M.T. DEGREE EXAMINATION – AUGUST 2015**

**SUBJECT: COMPUTERS AND MATHEMATICS**

Saturday, August 29, 2015

Time: 10.00 – 13.00 Hrs.

Max. Marks: 80

☞ Answer SECTION – A and SECTION – B in two separate answer books.

### SECTION – A: COMPUTERS: 40 MARKS

☞ Answer ALL the questions.

1. Explain why computers are considered as an essential device in Nuclear Medicine.
2. Write a short note on input and output devices with examples.
3. What are Ramp converters? Why are they required in Nuclear Medicine? Explain on its working principle.
4. Explain on the various acquisition modes used in Nuclear Medicine for dynamic imaging.
5. Define the following terms:  
i) Byte      ii) Bus      iii) Seek time      iv) Filter
6. Briefly explain on image subtraction.
7. What is Time Activity Curve?
8. Write a short note on networking.

(5 marks × 8 = 40 marks)

### SECTION – B: MATHEMATICS: 40 MARKS

☞ Answer Any EIGHT questions of the following:

- 1A. Find the value of:  $\sin 420 \cdot \cos (-300)$
- 1B.  $2^x = 3^y = 6^{-z}$ , show that  $xy + yz + zx = 0$

(2+3 = 5 marks)

- 2A.  $A = \{x / x \text{ is a natural number } 0 < x < 6\}$ ;  $B = \{y / y \text{ is an even natural number } 0 < y < 12\}$ .  
Find  $A \cap B$ ,  $A \cup B$

- 2B. State and prove the Lagrange's Mean Value Theorem.

(2+3 = 5 marks)

3A. Differentiate:  $2\sqrt{x} - 3x^3 + 4 \log x$

3B. Find the equations of the tangent and normal to the curve  $2x^3 - 9xy + 2y^3 = 0$  at point (2,1)  
(2+3 = 5 marks)

4A. Define one-one function, onto function, even function and odd function.

4B. Derive the decay constant with the half-life concept of radioactivity.  
(2+3 = 5 marks)

5A. Find  $\lim_{x \rightarrow 0} \frac{\sqrt{(1+x)}-1}{x}$

5B. Evaluate  $\int_0^{\pi/2} \sin^2 x \, dx$   
(2+3 = 5 marks)

6A. Show that  $(\tan \theta + \cot \theta)^2 = \sec^2 \theta + \operatorname{cosec}^2 \theta$

6B. Evaluate:  $\int x \cos^2 x \, dx$   
(2+3 = 5 marks)

7. 900mCi of I-131 calibrated for Monday 12 noon reached the department at 11am. Two patients were treated on the same day with 100 mCi each. On Saturday at 12p.m. How much activity would be available for treating the other patients? ( $t_{1/2} = 8$  days )  
(5 marks)

8A. Find x:  $\log_7 x + \log_7 x^2 + \log_7 x^3 = 6$

8B. Solve simultaneous equation:  $3x + 2y - 1 = 0$ ;  $x - y - 2 = 0$   
(2+3 = 5 marks)

9A. Define radian. Convert  $25^\circ$ ,  $35^\circ$  to radian and  $(3/4)^\circ$ ,  $(2/5)^\circ$  to degree.

9B. Derive differential equation by eliminating the arbitrary constant a.  
 $r = a(1 - \cos \theta)$   
(2+3 = 5 marks)

