

MANIPAL UNIVERSITY

FIRST YEAR B.Sc. N.M.T. DEGREE EXAMINATION – AUGUST 2013

SUBJECT: COMPUTERS AND MATHEMATICS

Monday, August 26, 2013

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

1. Answer all the questions:

- 1A. What is PROM and buffer memory?
- 1B. Write a short note on the Control Section and Arithmetic/Logic unit of the computer.
- 1C. What is Gamma Camera Interface? Briefly explain the working principle of the same.
- 1D. How does a computer operate? Name any two input and output devices.
- 1E. Write a short note on Time Activity Curve.
- 1F. Define the following terms:
 i) Software ii) Pixel iii) Frame rate iv) Analogue Number
- 1G. Write a short note on Region of Interest and PACS.
- 1H. What is the net corrected kidney counts if the
 i) Total counts obtained from the left and right kidney ROI is 58650 and 63439 respectively
 ii) Number of pixels in the left and right kidney ROI is 1434 and 1532 respectively
 iii) Background count for both the ROI is 3934
 iv) Number of pixels in the background ROI is 200?

(5×8 = 40 marks)

SECTION – B: MATHEMATICS: 40 MARKS

✍ **Answer any EIGHT questions of the following:**

2A. Find the value of : $\sin 420. \cos (-300)$

2B. Differentiate with respect to x: $y = \frac{x^2}{3x-2}$

(2+3 = 5 marks)

3A. Explain the graph of $\sin x$.

3B. Solve the differential equation $\frac{dy}{dx} + xy = xy^2$

(2+3 = 5 marks)

4A. Solve the equation $x^2 - 5x - 14 = 0$ by using factorising method.

4B. Find the angle of intersection of $y = 3x^2 - 4x + 5$ and $2y = 9 - x$ at $(1, 4)$.

(2+3 = 5 marks)

5A. Find x : $\log_7 x + \log_7 x^2 + \log_7 x^3 = 6$

5B. Prove that: $\lim_{\theta \rightarrow 0} \frac{\sin \theta}{\theta} = 1$

(2+3 = 5 marks)

6A. Evaluate: $\int_1^2 (x^2 + 1) dx$.

6B. Evaluate: $\int x \cos^2 x dx$.

(2+3 = 5 marks)

7A. Define one-one function, onto function, even function and odd function.

7B. Convert 250 mCi into GBq.

(2+3 = 5 marks)

8. The activity of Tc-99m at the time of disposal in lead dustbin was 0.5 mCi. What is the activity after 10 days ($t_{1/2} = 6$ hrs)?

(5 marks)

9A. Write the definition of radian and write the signs of trigonometric ratios in all the quadrants.

9B. Find the value of $\frac{\sin 135^\circ - \cos 120^\circ}{\cos 135^\circ + \sin 480^\circ}$

(2+3 = 5 marks)

10A. $A = \{x / 0 < x \text{ is a natural number } < 6\}$; $B = \{y / 0 < y \text{ is an even natural number } < 12\}$.

Find $A \cap B, A \cup B$.

10B. State and prove the Lagrange's Mean Value Theorem.

(2+3 = 5 marks)

