MANIPAL UNIVERSITY

FIRST YEAR B.Sc. N.M.T. DEGREE EXAMINATION – AUGUST 2012

SUBJECT: COMPUTERS AND MATHEMATICS

Friday, August 24, 2012

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.   Differentiate between list mode and frame mode.

(5 marks)

1B.   For a gamma camera having 0.96cm as FWHM and 500mm as the FOV, which matrix size would give an optimum resolution?

(5 marks)

1C.   **Convert the following:**
   i) $(68)_{10}$
   ii) $(80)_2$

($2\frac{1}{2} \times 2 = 5$ marks)

1D.   **Define the following terms:**
   i)   Hardware
   ii)   Software
   iii) Analogue Number
   iv)   Digital number

($1\frac{1}{4} \times 4 = 5$ marks)

1E.   What is Cache Memory?

(5 marks)

1F.   Write a short note on Image Smoothing.

(5 marks)

1G.   Write a short note on Region of Interest and PACS.

(5 marks)

IH.   Write on digital images.

(5 marks)

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

1A. The length of an arc of a circle of radius 10 cm is 4 cm. Find the central angle.
1B. A= {x/x is a natural number < 6}; B = {y/y is an even natural number < 12}
Find A∩B, A∪B, (A∩B).

(2+3 = 5 marks)

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

(2+3 = 5 marks)

3A. Define one-one function, onto function, even function and odd function.
3B. Prove that: $\underset{\theta \to 0}{Lt} \dfrac{\sin\theta}{\theta} = 1$.

(2+3 = 5 marks)

4A. The diameter of a cylinder is 28 cm and its height is 20 cm. Find the total surface area.
4B. Verify Lagrange's Mean Value Theorem for the function:
$f(x) = x^{10} - x^4 + 1$ for $\varphi \varepsilon$ (-1, 1)

(2+3 = 5 marks)

5A. Solve quadratic equation by using quadratic formula: $0.2x^2 = 3.5 - 0.3x$
5B. Solve simultaneous equation: 3x + 2y – 1 = 0; x – y – 2 = 0

(2+3 = 5 marks)

6A. Find the slope of the tangent: $\sqrt{x} + \sqrt{y} = 5$ at (4, 9)
6B. Differentiate y = sin x with respect to x using first principle of derivative.

(2+3 = 5 marks)

7A. Evaluate: $\int \log x \; dx$
7B. Form differential equation by eliminating the arbitrary constant 'a': $ay^2 = x^3$

(2+3 = 5 marks)

8. Evaluate: $-\int \dfrac{2x+1}{x^2 - 3x + 2} dx$

(5 marks)

9. 300mCi of I-131 calibrated on 02-03-08 at 12.30pm and 100mCi of the activity used on that time. What is the remaining activity on 15-03-08 at 10 a.m.? ($t_{\frac{1}{2}}$ = 8 hrs)

(5 marks)

MANIPAL UNIVERSITY

FIRST YEAR B.O.T (NR)/B.Sc. M.I.T/ B.Sc. R.T/B.Sc. N.M.T/ DEGREE EXAMINATION – AUGUST 2012

SUBJECT: PHYSIOLOGY

Wednesday, August 22, 2012

Time: 10.00-11.30 Hours.   Max. Marks: 40

✍ **Answer ALL questions. Draw diagrams wherever necessary.**

1.   **Essay questions:**

1A. With the help of a schematic diagram, explain the process of intrinsic pathway of blood coagulation.

1B. Draw a neat labeled diagram of neuromuscular junction. Describe the events that occur during neuromuscular transmission in the form of flow chart.

1C. Mention three functions of middle ear. Describe any one.

1D. List any four hormones secreted by anterior pituitary and explain the actions of any one hormone.

(5×4 = 20 marks)

2.   **Write short answers for the following:**

2A. Explain facilitated diffusion with an example.

2B. Mention two functions of lymph.

2C. Discuss two properties of sensory receptors.

2D. Define cardiac output. Give its normal value.

2E. Mention any two clinical features of Addison's disease.

2F. Describe the second stage of deglutition.

2G. List two functions of kidneys.

2H. What are the different types of hypoxia?

2I. Name the receptors for smell and taste. Where are they located?

2J. Mention any two actions of progesterone.

(2×10 = 20 marks)