MANIPAL UNIVERSITY

FIRST YEAR B.Sc. M.R.T. DEGREE EXAMINATION – JUNE 2011

SUBJECT: BASIC SCIENCE: ANATOMY

Monday, June 06, 2011

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

✍ **Answer all questions.**

✍ **Draw diagrams wherever necessary.**

1A.   Name the parts of the respiratory system.

1B.   Describe the lungs.

(5+15 = 20 marks)

2A.   Describe the different types of muscles.

2B.   Describe the mediastinum.

(10+10 = 20 marks)

3.   **Write briefly on:**

3A.   Liver

3B.   Urinary bladder

3C.   Testis

3D.   Thyroid gland

3E.   Thin skin

(5×5 = 25 marks)

4.   **Write short notes on:**

4A.   External features of spinal cord

4B.   Corpus striatum

4C.   Corpus callosum

4D.   Tongue

4E.   Uterine tube.

(3×5 = 15 marks)

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FIRST YEAR B.P.T./B.O.T./B.Sc.M.L.T./B.Sc.N.M.T/B.Sc.R.T. /B.Sc.M.R.T.

DEGREE EXAMINATION – JUNE 2011

SUBJECT: PHYSIOLOGY

Wednesday, June 08, 2011

Time: 10.00-13.00 Hours.   Max. Marks: 80

✍ **Answer all questions.**

1. Describe the stages of erythropoiesis. Add a note on regulation of erythropoiesis.

(10 marks)

2. Mention any six functions of hypothalamus. Explain any two.

(10 marks)

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

3A. Describe the chemical regulation of respiration.

3B. Draw a neat labelled diagram of the stretch reflex arc.

3C. Describe the process of deglutition.

3D. Enumerate the events of neuromuscular transmission.

3E. Describe erythroblastosis fetalis.

3F. Define glomerular filtration rate (GFR). Give its normal value. Describe the factors affecting GFR.

3G. Mention the hormones of anterior pituitary. Describe the functions of any two.

3H. Describe the functions of middle ear.

(5×8 = 40 marks)

4. **Write brief answers to each of the following:**

4A. Define the following terms:
   i)   Vital capacity   ii)   Cyanosis

4B. Mention two clinical features of cerebellar lesion

4C. Name the hormones of ovaries. State one function of each.

4D. What is myopia? How is it corrected?

4E. List two uses of an electrocardiogram (ECG).

4F. Draw a neat labelled diagram of a nephron.

4G. Mention two differences between passive transport and active transport.

4H. Name one permanent contraceptive method in males and females.

4I. What is Cushing's syndrome? Mention two clinical features of this syndrome.

4J. Give the average normal value for the following:
   i)   Hemoglobin concentration in adult males
   ii)   Cardiac output in adults

(2×10 = 20 marks)

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FIRST YEAR B.Sc. M.R.T. DEGREE EXAMINATION – JUNE 2011

SUBJECT: RADIOBIOLOGY

Friday, June 10, 2011

Time: 10:00-11:30 Hrs.   Max. Marks: 40

1.   **Answer the following questions:**

1A.   Describe the effect of radiation on fetus.

1B.   Discuss Genetically significant dose (GSD).

1C.   Add a brief note on Photoelectric effect.

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

(5×4 = 20 marks)

2.   **Answer the following questions:**

2A.   How the radiation affects chromosome of the cell? Write a detailed description of various chromosomal aberrations induced by radiation with illustrated diagrams.

2B.   Describe the interaction radiation with water and the associated chain reaction.

(10×2 = 20 marks)

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FIRST YEAR B.Sc. M.R.T. DEGREE EXAMINATION – JUNE 2011

SUBJECT: BASIC AND APPLIED MATHEMATICS

Monday, June 13, 2011

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

✍ **Answer any FIVE full questions.**

1A. Define Cartesian product of two sets A and B. If A= $\{1,2,3\}$, find A× A.

Is $A \times B = B \times A$ in general?

1B. If $A = \{1,3,5\}, B = \{2,3,5\}$ find

$(A \cap B) \times (A - B)$, $A \times (A - B)$, $(A \Delta B) \times (A \cap B)$.

1C. Define a null(void) set. Give two proper subsets and two supersets of the set of all vowels of the English alphabet. If $U = \{1, 2, 3, 4, 5, 6\}$, $A = \{3, 4, 5\}$ and $B = \{1, 3\}$,

Find (i) Power set of A (ii) $n(A \cup B) - n(A \cap B)$ (iii) $(A^C \cap B^C)^C$.

(4+6+6 = 16 marks)

2A. If $x = a\cos^2 t + b\sin^2 t$ then show that $(x - a)(b - x) = \dfrac{(a - b)^2}{4}\sin^2 2t$.

2B. Find the value of

(i) $\dfrac{\sin 135° + \cos 480°}{\sin 135° - \cos 120°}$ (ii) $\csc(1305°)$ (iii) $\tan(75°)$.

2C. The angle of elevation of a stationary cloud from a point 25 meters above a lake is 15^0 and the angle of depression of its reflection in the lake is 45^0. What is the height of the cloud above the lake level?

(4+6+6 = 16 marks)

3A. Show that $f(x) = \left\{ \begin{array}{l} x e^{\frac{1}{x}} \Big/ 1 + e^{\frac{2}{x}} \quad , x \neq 0 \\ 0 \qquad\qquad , x = 0 \end{array} \right\}$ is continuous but not differentiable at x=0.

3B. State Cauchy's mean value theorem and verify it for

$f(x) = \sqrt{x}$ and $g(x) = \dfrac{1}{\sqrt{x}}$ over $[a, b], a > 0$.

3C. Obtain the first three non zero terms in the Maclaurin's series expansion of log(secx).

(4+6+6 = 16 marks)

4A. Evaluate (i) $\lim\limits_{x \to (-2)} \dfrac{x^5 + 32}{x + 2}$ (ii) $\lim\limits_{x \to 0} (\cot x)^{1/\log x}$

4B. Give the domains of the following functions:

(i) $y = \dfrac{2x}{2x + 7}$ (ii) $y = (x + 3)/\sqrt{x^2 - 5x + 4}$ (iii) $y = 1/\sqrt{-x^2 + 6x - 9}$.

4C. Sketch the following functions

i) $y = x^3$ and its inverse,   ii) $y = \sin x$ and its inverse

(4+6+6 = 16 marks)

5A. A small square is inscribed inside a circle and a larger square circumscribes the same circle. Find the ratio between areas of the squares.

5B. Evaluate (i) $\int \dfrac{5(x - 3)^2}{x\sqrt{x}} dx$ (ii) $\int e^{ax} \sin bx \, dx$ (iii) $\int \sin^2 x \, dx$.

5C. ABC is a right triangle. The length of its perimeter is 60 units and the size of its area is 150 square units. Find its sides?

(4+6+6 = 16 marks)

6A. State Newton's law of cooling. Obtain an expression for the temperature of the body.

6B. Solve (i) $(x + 1)y' - y = e^{3x}(x + 1)^2$ (ii) $x\dfrac{dy}{dx} + y = x^3 y^6$

6C. (i). Solve $y' + \dfrac{y\cos x + \sin y + y}{\sin x + x\cos y + x} = 0.$

(ii)   Radium decomposes at a rate proportional to the quantity of radium present. Suppose that it is found that in 25 years approximately 1.1% of a certain quantity of radium has decomposed. Determine approximately how long will it take for the one-half of the original amount of radium to decompose?

(4+6+6 = 16 marks)