



RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B.Sc. (General) Degree in Applied Sciences
First Year – Semester I Examination– June/ July 2018

CMP 1202 – BASIC MATHEMATICS FOR BIO STUDENTS

Time: Two (02) hours

Answer **all** questions.

1. a) Solve each of the following inequalities and express the solution on a real number line.

(i) $2(3x + 4) > 1 - x$

(ii) $|x - 4| \leq 3$

(20 marks)

- b) Find the solutions of each of the following equations.

(i) $x^2 + 7x + 6 = 0$

(ii) $2x^2 + x - 10 = 0$

(40 marks)

- c) Sketch the graph of the equation, $y = x^2 - 2x - 3$ in a Cartesian coordinate system and identify the x intercepts and the axis of symmetry of the graph.

(40 marks)

2. a) Find the exact value of each of the followings.

(i) $\cos(105^\circ)$

(ii) $\sin\left(-\frac{\pi}{12}\right)$

(20 marks)

2
b) Verify the following Trigonometric identities.

(i) $5 \sin^2 x + 4 \cos^2 x = \sin^2 x + 4$

(ii) $\frac{\sin x + \sin 3x}{\cos x + \cos 3x} = \tan 2x$

(40 marks)

c) Find the limits of the followings.

(i) $\lim_{x \rightarrow 3} \frac{x^2 - 7x + 12}{x - 3}$

(ii) $\lim_{x \rightarrow 2} \frac{\sin(x - 2)}{x^2 - x - 2}$

(40 marks)

3. a) Let $y = e^{-x}(\cos 2x + \sin 2x)$

(i) Show that, $\frac{d^2 y}{dx^2} + 2 \frac{dy}{dx} + 5y = 0$.

(ii) Find $\left(\frac{d^3 y}{dx^3} \right)_{x=0}$

(60 marks)

b) Find each of the following integrations.

(i) $\int (x^{\frac{2}{3}} + 2x + 3) dx$

(ii) $\int \frac{(x^2 + 5x + 1)}{x^2} dx$

(40 marks)

4. a) Consider the matrices, $A = \begin{pmatrix} 2 & -1 \\ 5 & 4 \end{pmatrix}$, $B = \begin{pmatrix} 1 & 0 & -2 \\ -1 & 3 & 5 \end{pmatrix}$ and $C = \begin{pmatrix} -7 & -2 \\ 1 & 3 \end{pmatrix}$ and find the followings.

(i) $A + C$

(ii) AB

(iii) Transpose of matrix B, (B^T)

(iv) Inverse of matrix A, (A^{-1})

(60 marks)

- b) Let $\underline{u} = (-3, 4)$ and $\underline{v} = (-1, 5)$ are two vectors and hence find the followings.

(i) $3\underline{u} - 2\underline{v}$

(ii) Magnitude of vector \underline{u}

(iii) Unit vector of vector \underline{u}

(40 marks)

END