RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

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

FDN 1204 – BASIC MATHEMATICS

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) $\cos(105^0)$

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

(20 marks)

b) Verify the following Trigonometric identities.

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

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

(40 marks)

c) Find the limits of the followings.

(i) $\lim\limits_{x\to 3} \dfrac{x^2 - 7x + 12}{x - 3}$

(ii) $\lim\limits_{x\to 2} \dfrac{\sin(x-2)}{x^2 - x - 2}$

(40 marks)

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

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

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

(60 marks)

b) Find each of the following integrations.

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

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

(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})

(50 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 $\underline{u}$

(50 marks)

END