EASTERN UNIVERSITY, SRI LANKA

DEPARTMENT OF MATHEMATICS

FIRST YEAR EXAMINATION IN SCIENCE -2011/2012

FIRST SEMESTER (Jan./Feb., 2014)

CC 103 – BIO MATHEMATICS

Answer all questions.   Time: One hour.

01. (a) Simplify the following expression:

$$\left(\frac{x^2 - xy}{xy + y^2} \div \frac{x^2 - y^2}{x^2 + 2xy + y^2} \right) \div \left(\frac{x^2 - 2xy + y^2}{x^2 y - xy^2} \right).$$

(b) Solve the following equation for x:

$$(x + 3) + \left(\frac{3}{x-1} \right) = \frac{4-x}{x-1}.$$

(c) Prove the trigonometric identity

$$\sin x + \sin 2x + \sin 3x = \sin 2x \, (1 + 2 \cos x).$$

(d) A line LM goes through two points A= (2, 5) and B= (6, 25). Find the equation of the straight line XY that goes through the point C= (4, 4) and parallel to the line LM.

(e) Define the convergence of the infinite series $\sum_{n=1}^{\infty} a_n$.

Test the convergence of the series $\sum_{n=1}^{\infty} \frac{1}{n(n+1)}$.

You may use the following identity without prove

$$\frac{1}{n(n+1)} = \frac{1}{n} - \frac{1}{n+1}.$$

(P. T. O.)

02. (a) Find the limit of the following:

$$\lim_{x \to 2} \frac{x^2 - 4}{x - 2}.$$

(b) Differentiate the following with respect to x:

$$y = \frac{x + 5}{x^2 + 2x + 1}.$$

(c) Evaluate the following definite integral:

$$y = \int_0^1 x^4 (1 + x^2)^2 \, dx.$$

(d) If $z_1 = 4 + 3i$, $z_2 = 1 - 3i$ and $z_3 = 5$ are the complex numbers, find the following:

$$(z_1 + z_3) * z_2.$$

(e) Find the minimum and maximum points of the following function, if any:

$$f(x) = 2x^2 - 5x - 7.$$