EASTERN UNIVERSITY, SRI LANKA

DEPARTMENT OF MATHEMATICS

FIRST EXAMINATION IN SCIENCE(2015/2016)

FIRST SEMESTER (Jul./Aug., 2017)

CC 103 - BIO MATHEMATICS

Answer all question **Time: One hour**

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1. (a) Simplify the following:

   i. $\dfrac{\sqrt[3]{343x^{3/2}}}{x^{1/2}}$;

   ii. $(81y^4)^{1/4} \times (32x^{10})^{2/5} \div (8x^{-3})^{2/3}$.

   (b) Solve the following equations:

   i. $3^x \times 3^{x+1} = 3^3$;

   ii. $\log_5(25 \log_2 x) = 3$.

   (c) Factorize the following:

   i. $4x^2 + 12xy + 9y^2$;

   ii. $2xy - 4xyz + 2xyz^2$.

   (d) If $a^2 + b^2 = 38ab$ then, prove that

$$2 \log \left[\frac{a-b}{6}\right] = \log a + \log b.$$

   (e) Find the equation of a straight line that passing through the point $\left(\frac{2}{3}, \frac{4}{3}\right)$ and perpendicular to the straight line $x - 3y - 7 = 0$.

2. (a) Evaluate the following:

   i. $\lim_{x \to 2} \dfrac{x^2 - 4}{x - 2}$;

   ii. $\lim_{x \to \infty} \dfrac{1 + 3x^2 - 7x^3 - 21x^4}{4 + x^3 + 3x^4}$;

   iii. $\lim_{x \to 4} \dfrac{x^2 - 16}{\sqrt{x^2 + 9} - 5}$.

   (b) Differentiate the following with respect to x.

   i. $y = x^2 - 4x + 9$;

   ii. $y = x \ln x$;

   iii. $y = e^x + \sin 2x$.

   (c) Integrate the following:

   i. $\displaystyle\int \frac{3x + 3}{3x^2 + 6x + 17}\, dx$;

   ii. $\displaystyle\int \frac{1 - 2x}{\sqrt{3 + x - x^2}}\, dx$.

   (d) Find the maximum and minimum points of the function $y = 4x^3 + 9x^2 - 12x + 3$.