EASTERN UNIVERSITY, SRI LANKA

DEPARTMENT OF MATHEMATICS

FIRST EXAMINATION IN SCIENCE(2014/2015)

FIRST SEMESTER (Aug./Sept., 2016)

CC 103 - BIO MATHEMATICS

Proper & Repeat

Answer all question **Time: One hour**

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1. (a) Simplify the following:

   i. $\dfrac{729\,(x^{-3}\,y^{-6})^{-6}}{9x^{18}\,y^{32}}$;

   ii. $\dfrac{\sqrt[3]{8y^{-6}x^{-3}}}{\sqrt{y^{-4}x^2}-3y^{-2}x}$.

   (b) Solve the following equations:

   i. $4\times 8^{2x-1}=32^{x+1}$;

   ii. $\log_3 a(a^2-1)-\log_3(a-1)-\log_3(a+1)=\log_3 27$.

   (c) Factorize the following:

   i. $x^3-3x^2y+3xy^2-y^3$;

   ii. $27a^6-64b^3$.

   (d) If $a^2+b^2=83\,ab$ then prove that $2\log\left(\dfrac{a-b}{9}\right)=\log a+\log b$.

   (e) Find the equation of a straight line that passing through the point $(1,2)$ and parallel to the straight line $2y=3x+2$.

2. (a) Differentiate the following with respect to x:

   i. $y = 4x^5 + 2x^3 - x^2 - 7$;

   ii. $y = \ln x^3 + \sin 2x$;

   iii. $y = \dfrac{(x+1)^2}{\sqrt{1+x^2}}$.

   (b) Evaluate the following:

   i. $\lim\limits_{x \to 0} \dfrac{x^4 + 2x^2}{x^3 + x}$;

   ii. $\lim\limits_{x \to \infty} \dfrac{8x^5 + 10x^4 + 6x^2 + 7}{3x^5 + 2x}$;

   iii. $\lim\limits_{x \to 2} \dfrac{4 - x^2}{(3 - \sqrt{x^2 + 5})}$.

   (c) Integrate the following:

   i. $\displaystyle\int (2x^5 + 2x)\, dx$;

   ii. $\displaystyle\int \frac{1}{x \ln x}\, dx$;

   iii. $\displaystyle\int \frac{-x}{\sqrt{4 - x^2}}\, dx$.

   (d) Find the turning points of the function $y = x^3 - 6x^2 + 9x - 2$, and commen
   points.