



**EASTERN UNIVERSITY, SRI LANKA**  
**DEPARTMENT OF MATHEMATICS**

**EXTERNAL DEGREE EXAMINATION IN SCIENCE -2008/2009**

**FIRST YEAR, FIRST SEMESTER (June/Sept., 2015)**

**EXTCC 103 - BIO MATHEMATICS**

**(REPEAT)**

Answer all questions

Time: One hour

Q1. (a) Simplify each of the following:

i.  $\frac{\sqrt[3]{8y^{-6}x^3}}{\sqrt{y^{-4}x^2 - 3y^{-2}x}}$ ;

ii.  $\left(\frac{81}{4}\right)^{-\frac{1}{2}} \times 8^0 \times \left(\frac{27}{8}\right)^{\frac{2}{3}} \times (0.5)^{-1}$ ;

(b) i. If  $a, b$  and  $c$  are three consecutive integers then show that

$$\log(1 + ac) = 2 \log b.$$

ii. If  $p = q^{2a}$ ,  $q = r^{2b}$  and  $r = p^{2c}$  then prove that  $abc = \frac{1}{8}$ .

iii. If  $2a - 3b = 2$  and  $ab = 6$  then find  $8a^3 - 27b^3$ .

(c) Solve the following equations:

i.  $x^2 + \frac{11}{2}x + 6 = 0$ ;

ii.  $4^{5-9x} = \frac{1}{8^{x-2}}$ ;

iii.  $\log_2(x^2 - 6x) = 3 + \log_2(1 - x)$ .

Q2. (a) Evaluate the following:

i.  $\lim_{x \rightarrow 2} \frac{4 - x^2}{3 - \sqrt{x^2 + 5}}$ ;

ii.  $\lim_{x \rightarrow \infty} \frac{x^2 + x - 2}{4x^3 - 1}$ .

(b) i. Differentiate the function  $y = e^{-x \sin x}$  with respect to  $x$ .

ii. Find the maximum and minimum points of the function  $y = x^3 - 2x^2 + x$ .

(c) Evaluate the following:

i. 
$$\int \frac{x^2 + 2}{x(x+2)(x-1)} dx;$$

ii. 
$$\int \frac{2x^2}{\sqrt[3]{x^3 + 1}} dx;$$

iii. 
$$\int_0^1 x \ln x dx.$$