



EASTERN UNIVERSITY, SRI LANKA
DEPARTMENT OF MATHEMATICS
FIRST EXAMINATION IN SCIENCE - 2010/2011
FIRST SEMESTER (Nov./Dec., 2012)
CC 103 - BIO MATHEMATICS
(PROPER & REPEAT)

Answer all Questions

Time: One hour

1. (a) Simplify each of the following:

i. $\left(\frac{3a^2b^2c}{4bc^2}\right) \times \left(\frac{5b^3c^2a}{6ac}\right) \div \left(\frac{3ab^2}{7a^2bc^3}\right);$

ii. $\left(\frac{81}{16}\right)^{-1/4} \times \frac{9}{4} \times \frac{1}{(256)^{1/4}};$

iii. $\frac{\sqrt[5]{32x^{-10}y^5}}{\sqrt{x^{-4}y^2 + x^{-2}y}}.$

(b) Solve the following equations:

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

ii. $\log_4 \sqrt{5x+3} - \frac{1}{2} = \log_4 \sqrt{x+1};$

iii. $3^{2x} - 4 \times 3^{x+1} + 3^3 = 0.$

(c) i. Show that if $p = q^{2a}$, $q = r^{2b}$ and $r = p^{2c}$, then $abc = \frac{1}{8}$.

ii. If $a^2 + b^2 = 11ab$, then show that $2 \log \left(\frac{a^2 - b}{3}\right) = \log a + \log b$.

2. (a) Find the values of the following:

i. $\lim_{x \rightarrow 1} \frac{\sqrt{2-x} - 1}{2 - \sqrt{x+3}};$

ii. $\lim_{x \rightarrow \infty} \frac{8x^{10} - 4x^6 + 3x - 12}{4x^{10} + 2x^8 - 3x^2 + 5x}.$

- (b) i. Differentiate the function $y = \sqrt{\frac{x^2 - 1}{x^2 + 1}}$ with respect to x .
ii. Find the maximum and minimum points, if exist, of the function

$$y = 4x^3 + 9x^2 - 12x + 13.$$

(c) Find the following integrals:

- i. $\int x^2 e^{2x} dx;$
ii. $\int \frac{2x + 1}{3x^2 + 4x + 1} dx.$