

EASTERN UNIVERSITY, SRI LANKA
DEPARTMENT OF MATHEMATICS

FIRST EXAMINATION IN SCIENCE -2007/2008 R A R Y

SECOND SEMESTER (Aug/Sept., 2009)

CC 103 - BIO MATHEMATICS

(RE-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 $(a^2 + b^2) = 7ab$, then prove that $\log(a + b) = \log 3 + \frac{1}{2} \log a + \frac{1}{2} \log b$.

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. $\log_2 8 + 2 \log_4 16 - 3 \log_8 x = 6$.

Q2. (a) Find the value of the following limit of the functions:

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

ii. $\lim_{x \rightarrow \infty} \frac{7x^9 - 4x^5 + 2x - 13}{-3x^9 + x^8 - 5x^2 + 2x}$.

(b) i. Differentiate the function $y = \sqrt{\frac{x-1}{x+1}}$ with respect to x .

ii. Find the stationary points and the maximum and minimum value of the function $y = x^3 - 2x^2 + x + 1$.

(c) Integrate the following functions with respect to x :

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

ii. Evaluate $\int_0^1 x \ln(x+3) dx.$