EASTERN UNIVERSITY, SRI LANKA
DEPARTMENT OF MATHEMATICS
EXTERNAL DEGREE EXAMINATION IN SCIENCE -2008/2009
FIRST YEAR, FIRST SEMESTER (July/August, 2010)
EXTCC 103 - BIO MATHEMATICS

Answer all Questions   Time: One hour

Q1. (a) Simplify each of the following:

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

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

(b)   i. If $2\sin(A+B) = \sqrt{3}$ and $\sqrt{2}\cos B = 1$ then find A and B.

     ii. If $x = \sqrt{\dfrac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}}$, then find the value of $x + \dfrac{1}{x}$.

     iii. If $\dfrac{1}{1-\sqrt{2}+\sqrt{3}} = a + b\sqrt{2} + c\sqrt{6}$, find $a+b+c$.

(c) Solve the following equations:

     i. $21 \times 7^{2x-1} - 7^{x+1} + 4 = 0$;

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

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

Q2. (a) Evaluate the following limits:

     i. $\lim\limits_{x \to 2} \dfrac{4 - x^2}{3 - \sqrt{x^2 + 5}}$;

     ii. $\lim\limits_{x \to \infty} \dfrac{7x^9 - 4x^5 + 2x - 13}{-3x^9 + x^8 - 5x^2 + 2x}$.

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

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ii. If $y = \dfrac{u-1}{u+1}$ and $u = \sqrt{x}$ then find $\dfrac{dy}{dx}$.

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

(c) Evaluate the following integrals:

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

ii. $\displaystyle\int_0^1 xe^{-4x}\, dx.$