EASTERN UNIVERSITY, SRI LANKA

External Degree Programme

First Year Examination in Science-2002/2003

(July/August-2004) (Repeat)

EXCC 102 - Bio Mathematics & Bio Statistics

Answer **four** questions only selecting **two** questions from each section

Time: Two hours

Section A

1. (a) Simplify each of the following:

   i. $\left(\dfrac{27}{8}\right)^{-1/3} \times \left(\dfrac{9}{4}\right) \times \left(\dfrac{1}{64}\right)^{1/3}$,

   ii. $\dfrac{xy^2}{(x^3y)^8} \div \dfrac{x}{y^3}$.

   (b) Factorize the following expressions:

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

   ii. $6x^2 - 11xy + 3y^2$,

   iii. $(3u + 2v)^3 - w^3$.

   (c) Solve the following equations:

   i. $x + \dfrac{1}{x} = 2$,

   ii. $4^y - 6(2^y) - 16 = 0$,

   iii. $\left[\dfrac{x+1}{x-1}\right]^2 - 6\left[\dfrac{x+1}{x-1}\right] + 5 = 0$.

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2. (a) Use the definition of logarithm to prove that,

    i. $\log_b mn = \log_b m + \log_b n$,

    ii. $\log_b \dfrac{m}{n} = \log_b m - \log_b n$,

    iii. $\log_b m^n = n \log_b m$.

    Given that $\log 3 = 0.4771$ and $\log 4 = 0.6021$.
    Find $\log 12$, $\quad \log \dfrac{3}{4}$ and $\log \sqrt{3}$.

(b) Evaluate the following by using the properties of logarithm:

    i. $\log \left(\dfrac{1}{256} \right) - \log \left(\dfrac{125}{4} \right) - 3 \log \left(\dfrac{1}{20} \right)$,

    ii. $2 \log 30 + 4 \log 2 - 2 \log 12$.

(c) If $a^2 + b^2 = 11ab$ then, prove that

$$2 \log \left[\dfrac{a-b}{3} \right] = \log a + \log b.$$

3. (a) Find the limit value of the following:

    i. $\lim\limits_{x \to 0} \left(\dfrac{1 - \sqrt{1 - x^2}}{x^2} \right)$,

    ii. $\lim\limits_{x \to \infty} \left(\dfrac{1 - x^3}{1 + x + 2x^3} \right)$.

(b) Differentiate the following functions with respect to x:

    i. $y = \ln \left(\dfrac{x^2 + 1}{x^2 - 1} \right)$,

    ii. $y = e^x (\sin 3x + \cos 3x)$,

    iii. $y = e^x \tan x$.

(c) Integrate the following:

i. $\int \dfrac{\ln x}{x\sqrt{(\ln x)^2 + 2}} \, dx,$

ii. $\int x^2 e^x \, dx,$

iii. $\int_0^1 (x^2 + x)^2 \, dx.$

Section B

4. Briefly explain the following.

(a) Diagrammatic Representation.

(b) Measures of dispersion.

(c) Normal distribution.

5. Distinguish between the following within each pair.

(a) Primary Data and Secondary Data.

(b) Population and Sample.

(c) Positive Correlation and Negative Correlation.

(d) Binomial distribution and Poisson distribution.

6. Write an account on the following in relation to bio statistics.

(a) Averages.

(b) Skewness.

(c) Probability.