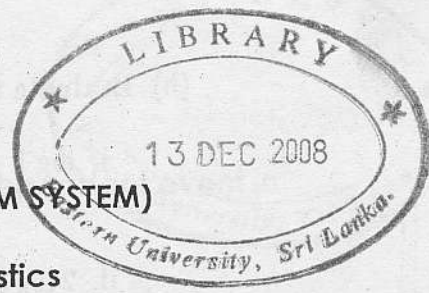


EASTERN UNIVERSITY, SRI LANKA
FACULTY OF SCIENCE
EXTERNAL DEGREE
FIRST EXAMINATION IN SCIENCE – 1998/99 (TERM SYSTEM)
Re-Repeat – 2004/2005 (June 2008)
EXTCC 102 / Bio-Mathematics & Bio-Statistics



Time: 02 hrs

Answer **FOUR** questions only selecting at least **TWO** from each section

SECTION – A

1. (a) Simplify each of the following:

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

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

(b) Factorize the following expressions:

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

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

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

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

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

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

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

Given that $\log 3 = 0.4771$ and $\log 4 = 0.6021$.

Find $\log 12$, $\log \frac{3}{4}$ and $\log \sqrt{3}$.

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

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

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

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

i. $\lim_{x \rightarrow 0} \left(\frac{1 - \sqrt{1 - x^2}}{x^2} \right)$,

ii. $\lim_{x \rightarrow \infty} \left(\frac{1 - x^2}{1 + x + 2x^3} \right)$.

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

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

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

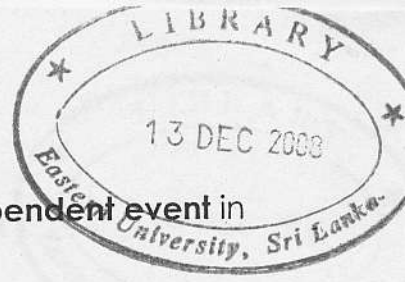
iii. $y = e^x \tan x$.

(c) Integrate the following:

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

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

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



SECTION - B

4. (a). Briefly explain **sample space, an event and independent event** in probability with suitable examples, if possible.
- (b) A bag contains 10 white and 6 black balls. Two balls are drawn at random one after the other without replacement. Find the probability that both the balls are drawn is black.
- (c) An urn contains 12 white and 20 black balls. A second urn contains 16 white and 24 black balls. One ball drawn from each of the urns. What is the probability of the balls drawn are both white.
5. (a) Summarize your knowledge about the following in relation to biostatistics with examples, if necessary.
- (i) Null hypothesis
 - (ii) Normal distribution
- (b) Compare the following
- (a) Simple bar diagram and component bar diagram
 - (b) Frequency polygon and frequency curve
6. (a) Chemical compositions of four plant species are given below. Draw a percentage bar diagram and pie diagram.

Plant species	Water (g)	Carbohydrate (g)	Protein (g)	Fat (g)	Total weight (g)
Castor	3	2	3	17	25
Pea	8	6	24	2	40
Wheat	4	14	5	2	25
Soy bean	4	6	24	6	40

(b) The income of 70 persons is distributed as follows. Draw the diagram of the data and hence find the modal value

Income	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Persons	10	15	25	12	8