EASTERN UNIVERSITY, SRI LANKA

FACULTY OF AGRICULTURE

FIRST YEAR FIRST SEMESTER EXAMINATION IN AGRICULTURE – 2005/2006

AEN 1103 – BASIC MATHEMATICS (1:15/00)

Answer all questions

Time allowed: One hour

Q1. a) (i) If $m = a^x$, $n = a^y$ and $m^y n^x = a^{2(x+y)}$, then show that

$$\frac{1}{x} + \frac{1}{y} = 1.$$

(ii) Prove that

$$\frac{\sin A}{1+\cos A} + \frac{1+\cos A}{\sin A} = 2\csc A.$$

b) Evaluate the following limits:

(i) $\lim_{x \to 5} \frac{(x^2 - 5x)}{(x-5)}$;

(ii) $\lim_{x \to 2} \left[\frac{\sqrt{x+7} - 3}{x-2} \right]$.

c) Differentiate the following:

(i) Using the power rule

$$y = \frac{8}{\sqrt{5x^2 + 2x}};$$

(ii) Using the product rule

$$y = \frac{(2x^2 + 2)}{x^3};$$

(iii) Using the quotient rule

$$y = \frac{(x^2 + 3)}{(2x + 5)}.$$

Q2. a) A right circular cylinder has a given volume V.

(i) Express the total surface area S, in terms of V and the radius of the cylinder.

(ii) Show that S is least when the length and diameter of the cylinder are equal.

(iii) Find this least area when $V = 250\pi \text{ cm}^3$.

(P. T. O)

b) Find the co-ordinates of the maximum and minimum points of the cu
$y = 4 + 12x - 3x^2 - 2x^3$.

c) Integrate the following:

(i) $\int x^2 \left(x^3 + 1\right) dx$;

(ii) $\int \sin^3 x \, dx$;

(iii) $\int \sin x \cos x \, dx$.