The Open University of Sri Lanka
Faculty of Engineering Technology
Industrial Studies Program of study
Final Examination- 2004/2005
AEZ3238 Mathematics for Agriculture

Date : 19-03-2006
Time : 0930-1230
Duration : Three (03) hours

SECTION B

Answer five (05) questions only. All questions carry equal marks.

1. (i) Show that the roots of $ax^2 + bx + c = 0$ are $x = \dfrac{-b-\sqrt{b^2-4ac}}{2a}$ and

$x = \dfrac{-b+\sqrt{b^2-4ac}}{2a}$.

(ii) If $x^2 + (k-9)x + 9 = 0$ has equal roots then find the possible real values for k.

(iii) Solve the following equations for x.

a). $x^2 - 2x - 255 = 0$

b). $0.6^x = 0.3$

2. Write sin (A +B) and cos(A +B) in terms of sin A, sin B, cos A and cos B.

Show that $\tan(A+B) = \dfrac{\tan A + \tan B}{1 - \tan A \tan B}$.

Deduce that $\tan 2A = \dfrac{2\tan A}{1-\tan^2 A}$.

Using the standard values and the above results find the values of tan 105^0 and cot 120^0

(**Hint:** $\cot x = \dfrac{1}{\tan x}$).

3. (i). Differentiate the followings:

(*a*) $y = x^2 + x + \frac{1}{x} + \frac{1}{x^2}$. (*b*) $y = \sin(e^{2x})$.

(*c*) $y = e^{\sin x}$.

(ii). Integrate the following functions with respect to the corresponding variables:

(*a*) $\int\left(t^2 + t + \frac{1}{t} + \frac{1}{t^2}\right)dt$. (*b*) $\int \cos 5x\, dx$.

(*c*) $\int_1^2 \sin(\pi x)dx$.

4. (i) If $y = e^{\alpha x}$, where α is real, then show that $\frac{d^2y}{dx^2} - \alpha^2 y = 0$.

(ii) Using differentiation find the turning points of $f(x) = x^2 - 2x$.

(iii) Find the area which enclosed by X – axis and $f(x) = x^2 - 2x$ from $x = -1$ to $x = 1$.

5. With the standard notation write down three equations of motions for bodies with constant acceleration.

A particle moving in a straight line with constant acceleration travels a distance ***a*** in time t_1 and a distance ***b*** in the next time interval t_2. Prove that the acceleration is $\frac{2(bt_1 - at_2)}{t_1 t_2 (t_1 + t_2)}$.

6. Following table represents distribution of weights of male students at the Open University.

Weight (kg)	Number of Students
60 – 62	5
63 – 65	18
66 – 68	42
69 – 71	27
72 - 74	8

Construct (i) Histogram and

(ii) Cumulative frequency curve (ogive) for the above data.

Using **the graphs in part (i) and (ii)** find

(iii) Mode and

(iv) Median of the above data.

7. In an Agriculture production plant 10% of the production is defective. Determine the probability that of 5 items chosen at random

(i) 0 item,

(ii) 2 items will be defective.

Find the mean and the variance of the above 5 items.