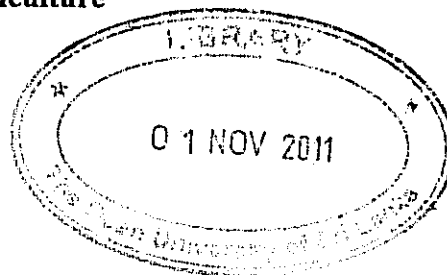The Open University of Sri Lanka
Faculty of Engineering Technology
Diploma/Degree in Industrial Studies (Agriculture)
Final Examination- 2010/2011

AEZ3238 Mathematics for Agriculture

Date	: 25-03-2011
Time	: 1400-1700
Duration	: **Three (03) hours**

SEPARATE SHEETS WILL BE PROVIDED TO ANSWER BOTH SECTIONS.

Instructions

1. This question paper consists of two sections.

   SECTION A

   Contains Fifteen (15) questions. You are required to answer all questions. You may spend about **one hour** to answer this section.

   SECTION B

   Contains Six (06) questions. You are required to answer ANY FOUR (04) questions. You may spend about **two hours** to answer the questions in this section.

2. Read the questions carefully before answering.

3. Please remember to write your registration number and your index number correctly on each answer script.

4. In case of doubt, please consult the supervisor or an invigilator conducting the examination.

SECTION A : Answer all questions.
Answer all questions.

1) Solve the following equation.

$(x + 1)^2 - 4 = 0$

2) Multiply the following expression.

$(4x - x^3) (x^2 + 2x + 4)$

3) Find the quotient and the remainder of the following .

$(x^3 + 4x^2 - 22x + 3) / (x-3)$

4) Make the letter in the bracket the subject of the formula.
$V^2 = U^2 + 2as$ (s)

5) Prove the following identities.

$\text{Cot } \Theta + \text{Tan } \Theta = \text{Sec } \Theta \text{ Cosec } \Theta$

6) Find the value of the following.

$\text{Sin } (135^0)$

7) Differentiate the function $y = 11x^4 + 5x^3 + 7x^2 + 13x$.

8) Integrate the function $f(x) = 8x^2 + 7x$.

9) Differentiate $y = (x^2 - x - 1)(x^2 + x - 1)$.

10) If $y = (3x^2 + 5x + 8)^7$, then find $\dfrac{dy}{dx}$

11) Define Mass and Weight.

12) Find the limits of the function $\dfrac{x}{2x+1}$ as x approaches ∞.

13). Find the resultant of two forces 15N and 20N acting at an angle of 90^0.

14) What is the force due to the gravity on a body mass of 5kg .
(Take acceleration due to gravity as g=10 ms^{-2})

15) If a horizontal force of 10Kg is applied on a rigid body in the direction of 60^0 to east ,
find its components in the east and north directions

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Section B :

Answer four (04) questions only. All questions carry equal marks.

1) (a) Factorize the followings.

    i) $x^2 - 2x - 15$ ii) $(x-3)^2 - 25$

  (b) Solve the following equation, $x^2 - 2x - 24 = 0$

  (c) Multiply the following expressions, $(3x + 5)(x - 7)$

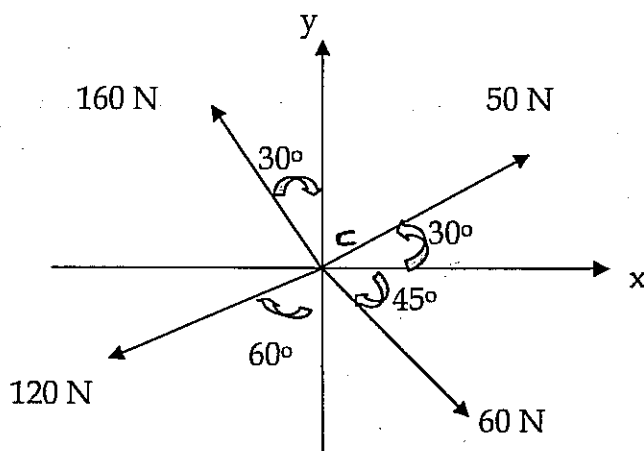 (d) Find the quotient and the remainder of the following.

    $(2x^2 - 3x - 5) / (x-1)$

  (e) Make the letter in the bracket the subject of the formula.

    (i) $PV^2 = RT (1-C) (v+b) - A$ for (T)

    (ii) $v^2 = u^2 + 2gh$ for (h)

2) (a) Four forces are 160N, 50N, 60N, 120N act on a plane through point C (see below

    figure). Find the direction and magnitude of the resultant force.

 (b) Find the resultant of forces 7N and 4N acting at a point horizontally.
       (i) in the same direction.
       (ii) in the opposite direction.

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3) (a) Write down the Newton's laws of motion .(Law 1,Law2 and Law 3)

(b) Explain the parallelogram law using a diagram.

(c) Two forces 5N and 7N act on a peg and the angle between the forces is 60^0 ,Find the magnitude and the direction of the resultant.
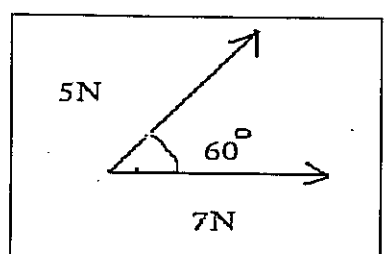
4) a)A beam of negligible mass compared to the loading ,rests on supports A and B,5m apart. . If a mass of 5kg is hung at a point C,3m from A. calculate the reaction forces at A and B , (Take g = 10ms^{-2})

b)A light horizontal rod ,40cm long, is supported by two vertical props each 10 cm from the ends of the rod, and is loaded with 16Kg at each end 32Kg and 8kg hung at point B and C respectively. Find W1 and W2.(g = 10ms^{-2})
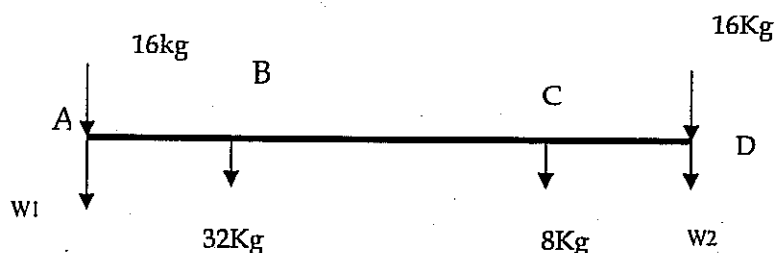
5)

a)Differentiate , following eqations.

i)$y = (x^2 - 5)(x^2 + 5)$

ii) $y = (x2 - x + 1)/(x3 + x - 1)$

b) Integrate the following equation.

$$\int \frac{3x+6}{x^2+5x+4} dx$$

c)Integrate the following equation.

$$\int \left(3x^2 + \frac{3}{x^2} + 10\right) dx$$

d) Find the limits of the function $(x^2 - a^2)/(x - a)$ as x approaches a.

(6) Prove the following.

(i) $\dfrac{\sin\theta}{1+\cos\theta} + \dfrac{1+\cos\theta}{Sin\theta} = \dfrac{2}{Sin\theta}$

(ii) sin A .cos A = sin A

(iii) $\tan(A+B) = \dfrac{\tan A + \tan B}{1 - \tan A \tan B}$