The Open University of Sri Lanka
Faculty of Engineering Technology

Industrial Studies Program

Final Examination- 2006

AEZ3238 Mathematics for Agriculture

Date   : 04-03-2007
Time   : 0930-1230 hours

SECTION II

1.

  (a) Differentiate with respect to x;
  - (i) $y = (3x + 2)(2x^3 + 7x - 5)$
  - (ii) $y = (Cos 2x)(Sin 3x)$

  (b) A rectangular block of land has perimeter of 100m. If we want to get the maximum area, what should be the dimension (length & width) of the land.
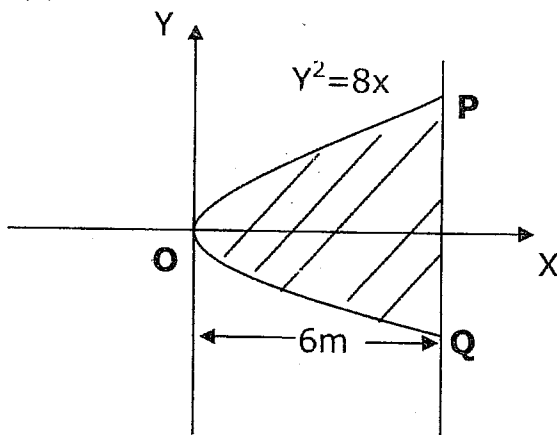
2.

  (a) Evaluate ;

  (i) $\int_{-1}^{2} (x^3 + 1) \ dx$

  (ii) $\int_{0}^{\pi} Cos \frac{1}{3} x \ dx$

  (b)

The above figure shows a parabolic plot of land, which has an equation $y^2 = 8x$ with respect to given axis. If OA=6m find the area of the land.

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3.
   (a) Find the range of K for the quadratic equation $x^2 - 2x + k - 4 = 0$ which has real roots.

   (b) Prove that the equation $x^2 + 2(c + 1)x - 2c - 3 = 0$ have real roots for the real values of C.

   (c) If the roots of $2x^2 - x - 4 = 0$ are α and β, Then find the value of $\alpha^2 + \beta^2$.

4. Prove the following

   (a) $\dfrac{1 + Tan^2\ A}{1 + Cot^2\ A} = \dfrac{Sin^2\ A}{Cos^2\ A}$ (c) $\dfrac{Sec\ x + Cosec\ x}{1 + Tan\ x} = Cosec\ x$

   (b) $\dfrac{1 - Tan\ A}{1 + Tan\ A} = \dfrac{Cot\ A - 1}{Cot\ A + 1}$

5.
   (a) ABC is an isosceles triangle in which AB = AC. A circle through B touching AC at the middle point and intersect AB at P. Show that AP = $\dfrac{1}{4}$ AB.

   (b) In a cyclic quadrilateral ABCD, the diagonal CA bisects the angle C. Prove that diagonal BD is parallel to the tangent at A to the circle through ABCD.
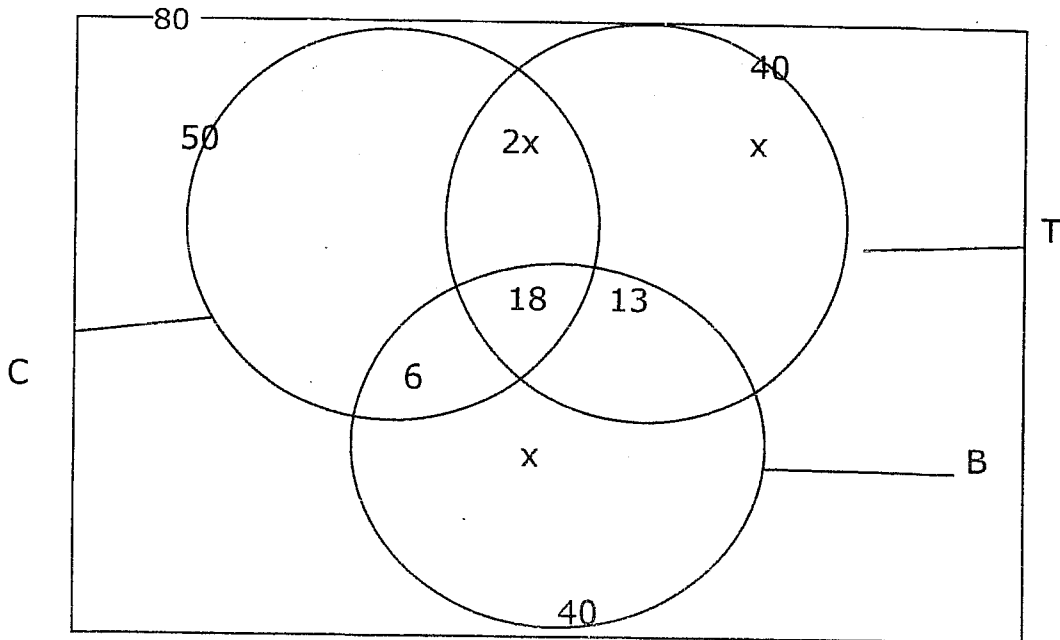
6.
   (a) An object is thrown with the velocity of 30ms⁻¹ at an angle of 45⁰ to the horizontal. Find the maximum height the object reach and the horizontal displacement when it hits the ground.

   (b)
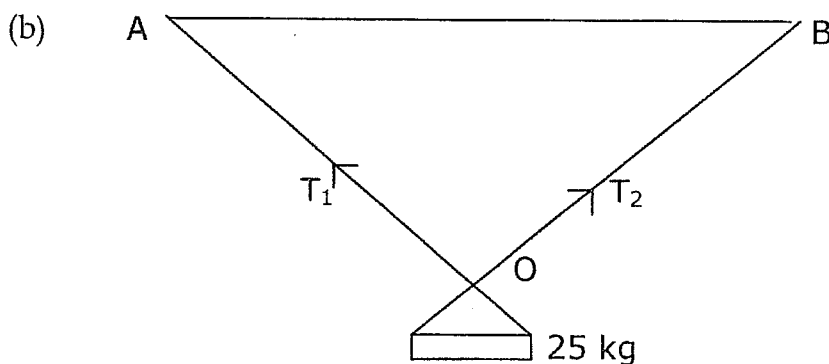
A feeder weighing 25kg is hanging with two ropes OA and OB from the ceiling of a poultry shed. Calculate the tensions T_1, T_2 of the ropes.

7.

Out of 80 farmers living in a village, 50 farmers cultivate chili, 40 farmers grow tomato and 40 farmers cultivate banana. 18 farmers cultivate all three types of crops. 06 farmers cultivate chili & banana only while 13 farmers cultivate tomato and banana only. A same number of farmers cultivate tomato only and bananas only. The number of farmers cultivating chili and tomato only is twice the number of farmers cultivating tomato only.

Find the number of farmers;

(a) Cultivating banana only
(b) Cultivating chili & tomato only
(c) Cultivating at least one of those crops.
(d) Not cultivating any of above three crops.