



STAMFORD COLLEGE

SCHOOL OF ENGINEERING

**FOUNDATION STUDIES IN ENGINEERING
(ELECTRICAL AND ELECTRONIC)**

KE016: COORDINATE GEOMETRY

Date : July 2007

Time : 2.00 pm – 4.10 pm

Duration: 2 hours + 10 minutes reading time

Instructions to Candidates

1. SIX questions set.
2. Answer any FOUR questions.
3. All questions carry equal marks.
4. Maximum marks attainable: 100

Please ensure that this examination paper contains SIX questions on TWO printed pages before you start the examination.

Books, papers and other written materials are not allowed to be brought into the examination hall. A candidate who violates the examination rules of Stamford College or commits a malpractice will be disqualified from the examination.

Write your Examination Index Number on each page of your answer booklet. **ANSWER ANY FOUR QUESTIONS**

Question 1

A, B, C are the points (4,3), (2,2) and (5,-4) respectively.

- Show that the lines **AB** and **BC** are perpendicular. (6 marks)
 - A point **D** is such that **ABCD** is a rectangle. Find the equation of the line **AD** and the equation of the line **CD**. Hence or otherwise find the coordinates of **D**. (10 marks)
 - Find the area of the rectangle **ABCD**. (9 marks)
- (Total = 25 marks)

Question 2

The left edge of the shaded crescent-shaped region, shown in Figure Q2, consists of an arc of a circle of radius r cm with centre O . The angle $AOB = (2/3)\pi$ radians.

The right edge of the shaded region is a circular arc with centre X , where $OX = r$ cm.

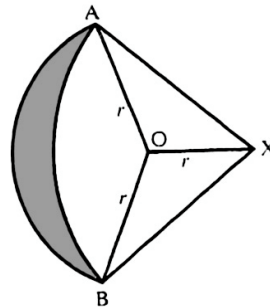


Figure Q2

- Show that angle $AXB = (1/3)\pi$ radians. (5 marks)
 - Show that $AX = r\sqrt{3}$ cm. (7 marks)
 - Calculate, in terms of r , π and $\sqrt{3}$, the area of the shaded region. (13 marks)
- (Total = 25 marks)

Question 3

- The circles $x^2 + y^2 + 4x - 3y + 1 = 0$ and $x^2 + y^2 + x - y - 2 = 0$ intersect at the points **A** and **B**. Find the equation of the common chord **AB**. (10 marks)
 - The circles $x^2 + y^2 + 3x - y - 5 = 0$ and $x^2 + y^2 - 2x + y - 1 = 0$ intersect at points **A** and **B**. Find the equation of the circle which passes through the origin and the points **A** and **B**. (15 marks)
- (Total = 25 marks)

Question 4

- a) Prove that the tangent of the angle between two straight lines whose gradients are m_1 and m_2 is given by:

$$\frac{m_1 - m_2}{1 + m_1 m_2}$$

(8 marks)

- b) Find the acute angle between the lines $y = 2x - 5$ and $3x + y = 4$. (8 marks)

- c) Find the equations of the lines which pass through the point (1,2) and which make an angle of 45° with the line $y = \frac{1}{2}(x - 4)$ (9 marks)

(Total = 25 marks)

Question 5

A, B, C are the points (7, 3), (-4, 1) and (-3,-2) respectively.

- a) Show that triangle **ABC** is isosceles. (8 marks)

- b) Find the midpoint of **BC**. (7 marks)

- c) Find the area of triangle **ABC**. (10 marks)

(Total = 25 marks)

Question 6

- a) Tabulate the values of θ and r for the curve $r = 1 + 2 \sin \theta$ for $0 \leq \theta \leq 2\pi$ (10 marks)

- b) Hence plot the curve in the range $0 \leq \theta \leq 2\pi$. (15 marks)

(Total = 25 marks)

- END OF PAPER -