



A Constituent College of Kenyatta University

UNIVERSITY EXAMINATIONS 2011/2012 ACADEMIC YEAR
1st YEAR EXAMINATION FOR THE DEGREE OF BACHELOR
SCIENCE AND BACHELOR OF EDUCATION SCIENCE
COURSE CODE/TITLE: SMA 103 -ANALYTICAL GEOMETRY

END OF SEMESTER: I

DURATION: 3 HOURS

DAY/TIME: THURSDAY 8.00 TO 11.00AM DATE: 1.12.2011 (GS1)

Instruction;-

Answer question ONE and any other Two questions

Question one

- (a) Find the equation of the line passing through the intersection of the lines
 $3x + y = 2$
 $x - 3y = 4$ and is perpendicular to the line $3x + 4y = 0$ (4marks)
- (b) Determine whether the line $x - 2y = 0$ cuts, touches or fails to meet the circle
 $x^2 + y^2 - 8x + 6y - 15 = 0$.if it touches or cuts find the co ordinates of point(s)of contact
or intersection. (5marks)
- (c) Find the equation and sketch the ellipse, whose eccentricity is $\frac{2}{3}$,
centre is at the origin and the directrix=6 and focus (1,0) (5marks)
- (d)(i) Determine the locus of all points p(x,y)that are equidistance from the point (4,8)
And the line y=5 (5marks)
- (i) find the distance from the point (-2,-3)to the line $8x + 15y - 24 = 0$

- (e) Determine the centre focus eccentricity and asymptotes of the hyperbola with the equation

$$9x^2 - 16y^2 - 18x - 64y - 199 = 0$$
 (5marks)
- (f) Explain the term orthogonal circles and show that the circles

$$x^2 + y^2 + 6x - 4y - 12 = 0$$
 are orthogonal (5marks)

$$x^2 + y^2 - 20x - 4y - 40 = 0$$
- (g) Find the vertex, focus, axis and directrix of the parabola

$$4y^2 - 8y + 3x - 2 = 0$$
 and sketch it (5marks)
- h) Define the following terms (i) Directrix
(ii) Hyperbola
(iii) Vertex in a conic section (6marks)

Question two

- (a) given that two lines l_1 and l_2 have and the inclinations θ_1 and θ_2 respectively.
Show that the angle between the two lines is given by arctan

$$\frac{m_2 - m_1}{1 + m_1 m_2}$$
 where m_1 and m_2 are the respective gradients (5marks)
- (b) (i) Find the equation of the tangent to the circle with centre, $c(2,5)$.
At the point $(6,3)$ (3marks)
(ii) find the equation of the circle passing through the points $A(-4,0), B(8,12)$
and $C(1,-1)$ (3marks)
- (c) Find the directrix, eccentricity and focus and centre of the ellipse whose equation is

$$x^2 + 4y^2 + 4x - 24y + 24 = 0$$
 (3marks)

Question three

- (a) Determine the points on the directrix of the hyperbola $(x = 7 \sec \phi, y \tan \phi)$
At which the tangent at the point $(x = 7 \sec 60, y \tan 60)$ passes through (5marks)
- (b) Determine the equation of a hyperbola, whose eccentricity is $\frac{3}{2}$,
And foci $F^1(-2,0)$ and $F(2,0)$ (5marks)
- c) Find the polar equation of a circle whose centre has the Cartesian
co-ordinates $c(5,8)$ and radius is 10 (5marks)

Question four

- (a) Find the equation of the parabola

$$x^2 - 22x + 24y + 169 = 0$$

at the point whose focal distance is 11 units

(7marks)

- (b) Find the vertex, focus, axis of symmetry, equation of the directrix and the length of latus rectum of the parabola of the parabola

$$x^2 - 10x - 6y + 40 = 0$$

(4marks)

- c) Find the directrix, eccentricity and focus of the ellipse given by

$$4x^2 + 9y^2 = 36$$

(4marks)