QUESTION THREE

[20 Marks]

(a) The equation of a parabola on the xy-plane is given by $y^2 - 4y - 6x + 10 = 0$. Determine

    (i) the Vertex V of the parabola   [4 Marks]

    (ii) the focus F of the parabola   [3 Marks]

    (iii) the directrix of the parabola   [3 Marks]

    (1v) the axis of the parabola   [2 Marks]

(b) Find the equation of the parabola given that the focus is $(6,8)$ and the directrix is the line $y = 2$

                                                    [4 marks]

(c) Determine the rectangular coordinates of the points with the following polar coordinates

    (i) $(6, \frac{\pi}{6})$ [2 marks]

    (ii) $(-4, \frac{-\pi}{4})$ [2 Marks]

QUESTION FOUR

[20 Marks]

(a) Show that the equation $4x^2 + y^2 - 8x + 4y + 4 = 0$ represents an ellipse hence determine its

    (i) Center   [5 Mark]

    (ii) Vertices   [3 Marks]

    (iii) Foci   [3 Marks]

    (iv) Eccentricity $e = \frac{c}{a}$ [2 Marks]

    (v) Directrices   [3 Marks]

(b) Find the parametric representation of the following cartesian equations: [4 Marks]

    (i) $2x - 1 = 3y$

    (ii) $x^2 + y^2 = 4$.

QUESTION FIVE [20 Marks]

(a) The equation $-x^2 + 4y^2 - 2x - 16y + 11 = 0$ represents a hyperbola. Determine its:

    (i) Center   [4 Marks]

    (ii) Vertices   [3 Marks]

    (iii) Foci   [3 Marks]

    (iv) Asymptotes   [3 Marks]

    (v) Directrices   [2 Marks]

(b) Sketch the polar curve of $r = 2 + 2\cos\theta$ in the range $0° \le \theta \le 360°$ and give its name [5 Marks]

QUESTION ONE (Compulsory)   [30 Marks]

(a) Identify the conic sections below: [4 Marks]

   (i) $x^2 - 2xy + y^2 = 0$.

   (ii) $3x^2 + 3y + 3y^2 - 7 = 0$.

   (iii) $4x^2 - y^2 - 4y + 8 = 0$.

   (iv) $3x^2 + 4xy + y^2 + 2x + 3y + 4 = 0$

(b) Determine the equation of a straight line passing through points (-3,-28) and (7,52)
    leaving your answer in double intercept form hence state the x and y intercepts.   [4 Marks].

(c) Determine the center and the equation of a circle with co-ordinates of the diameter
    (-1,3)and (7,6)   [5 Marks]

(d) Find the equation of the tangent to the circle at the point P(7,12) if the circle has
    center C(4,8).   [5 Marks]

(e) Convert the following polar coordinates into cartesian coordinates.   [4 Marks].

   (i) $(5, 70^0)$

   (ii) $(-2.5, -200^0)$

(f) Determine the center and the foci of the hyperbola $9y^2 - 16x^2 - 144 = 0$.   [4 Marks]

(g) Find the vertex and the focus of the parabola $y^2 = 24x$.   [4 Marks]

QUESTION TWO [20 Marks]

(a) Find the general and the normal equation forms of the line through the points
    A(7,3) and B(-1,5)   [6 Marks]

(b) Determine the angle of intersection between the line $5x + 8y - 3 = 0$ and $2x - 4y = 0$ [3 marks]

(c) Determine the distance from the point (4,8) to the line $y = 2x + 7$ [3 marks]

(d) Find the equation of the circle passing through the points (1,2), (3,7) and (2,-3)   [8 marks]