CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

RESIT/SPECIAL EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE, ECON STAT, BACHELOR OF EDUCATION (SCIENCE & ARTS)

MATH 124: GEOMETRY AND LINEAR ALGEBRA

STREAMS: **TIME: 2 HOURS**

DAY/DATE: WEDNESDAY 03/02/2021 **2.30 P.M – 4.30 P.M**

INSTRUCTIONS:

Answer ALL questions

Adhere to the instructions on the answer booklet.

QUESTION ONE (30MKS)

(a).Find the equation of the perpendicular bisector of the line segment with end points co ordinates given by P (-3 , 30) and Q (2, -1) [4marks].

(i). Find the angle α, between the lines y = 3x – 7 and y = -2x + 1 [4marks]

(ii). Find the distance between the points (3, 1) and the line 3x+4y – 3 = 0. [4marks]

(b). Analyse the graph of the equation $x^2 - 2x + 8y + 9 = 0$ [6marks]

(d). Calculate the eccentricity of the hyperbola given by the equation

$$\frac{x^2}{16} - \frac{y^2}{9} = 1$$ [4marks]

(e). Find the angle between the vectors $a = i - 2j + 4k$ and $b = -4i + j - 2k$ [4marks]

(f). Write the parametric and symmetric equations for the line through the point P(3 -1 2) and parallel to the vector n = (-2, 4, 5) (4marks)

QUESTION TWO 20MARKS

a. Find the value of t for which the vectors $a = 2ti + 4j + 2k$ and $b = i + 3k - j$ are orthogonal, Hence find a unit vector orthogonal to the vectors a and b [5marks]

b. Find the area of a parallelogram with adjacent sides given by the vectors $u = 2i + j - k$ and $v = 3i - 2j + 4k$ [5marks]

c. Identify the conic with polar equations $r = \frac{6}{3 - 2\cos\theta}$ [5marks]

d. Find the eccentricity of the ellipse with the semi axes given as (50, 20) [5marks]

QUESTION THREE 20MARKS

a. Discuss the consistency of the following system of equations using row reduction method hence solve it if found consistent. [7marks].

$$x + y + z = 3$$
$$x + 5y + 2z = 8$$
$$3x - y + 3z = 5$$

b. Find the centre and radius of the circle given by $3x^2 + 3y^2 + 30x - 36y + 36 = 0$ [5marks]

c. Write the equation of a hyperbola centred at the origin , eccentricity is $\sqrt{2}$, and the point (-5, 3) lies on the hyperbola [8 marks]
