



(Knowledge for Development)

KIBABII UNIVERSITY
UNIVERSITY EXAMINATIONS
2017/2018 ACADEMIC YEAR
FIRST YEAR FIRST SEMESTER
MAIN EXAMINATION
FOR THE DIPLOMA IN EDUCATION
MATHEMATICS

COURSE CODE: EDM 106

COURSE TITLE: TRIGONOMETRY, GEOMETRY AND VECTORS I

DATE: 17/01/18

TIME: 2.00 PM- 4.00 PM

INSTRUCTIONS TO CANDIDATES

Answer Question One and Any other TWO Questions

TIME: 2 Hours

This Paper Consists of 3 Printed Pages. Please Turn Over.

QUESTION ONE (28mks)

- a) Find the radius and the coordinates of the centre of the circle
 $2x^2 + 2y^2 - 8x + 5y + 10 = 0$ (5mrks)
- b) Differentiate a scalar and a vector quantity and give an example in each. (4mrks)
- c) Given the vectors $A = 4i + 5j - 6k$ and $B = i + 6j + 4k$.find (4mrks)
- A-B
 - A.B
- d) ΔABC with vertices $A(2,1)$ $B(3,5)$ and $C(-1, -2)$ is transformed into triangle $A'B'C'$ by a translation that maps a point A' onto $A'(6,4)$. Find the coordinates of B' and C' (4mrks)
- e) Solve the equations given that the angles are complementary. (3mrks)
 $\sin(2x + 40^\circ) = \cos(3x + 20^\circ)$
- f) Find the positive angles not greater than 180° which satisfy the equation. (4mrks)

$$\frac{\sin^2 \theta}{\cos \theta} - 2 \tan \theta = 0$$

- g) In a triangle , $QR = 3.5$, $RP = 4$ and $PQ = 5$. Calculate the size of angle P and hence find the area of the triangle. (4mrks)

QUESTION TWO (16mks)

- a) On the same axes, draw the graphs of $y = 2 \cos \frac{1}{2}x$ and $y = \sin x$ for $0^\circ \leq x \leq 360^\circ$. Hence;
- Find the values of x that satisfy the equations $2 \cos \frac{1}{2}x = \sin x$
 - State the amplitude and period in each case. (16mrks)

QUESTION THREE (16mks)

- a) The equation of a line l_1 is $2x - 3y = 7$. Find in the form of $ax + by + c = 0$, the equation of line l_2 that passes through $(4, -3)$ and is perpendicular to line l_1 . (4mrks)
- b) Verify that $(3,2)$ lie on the circle $x^2 + y^2 - 8x + 2y + 7 = 0$. Then find the equation of the tangent at this point. (8mrks)
- c) Find the equation of a common chord of the circles $x^2 + y^2 - 4x - 2y + 1 = 0$ and $x^2 + y^2 + 4x - 6y - 10 = 0$ (2mrks)
- d) Find the midpoint of the straight line joining $A(2,1)$ and $B(6,5)$ (2mrks)

QUESTION FOUR (16mks)

- a) Find the scalar projection of $(2,4, -1)$ onto $(3,3,4)$ (4mrks)
- b) Find the magnitude and direction of the displacement vector
- \overrightarrow{AB}
 - \overrightarrow{BA}

Where A and B are the points $(2,1)$ and $(8,9)$ respectively. (6mrks)

- c) Given that A is a point $(1,3)$ and that \overrightarrow{AB} and \overrightarrow{AD} are $\begin{pmatrix} 4 \\ -1 \end{pmatrix}$ and $\begin{pmatrix} 2 \\ 3 \end{pmatrix}$ respectively. Find the coordinates of the vertices B, C, D of the parallelogram $ABCD$. (4mrks)
- d) Given the point $A(1,1)$ $B(5,4)$ $C(8,9)$ and $D(0,3)$. Show that $ABCD$ is a trapezium. (2mrks)

QUESTION FIVE (16mks)

- a) Solve triangle XYZ in which $x = 13.4\text{cm}$, $z = 5\text{cm}$ and angle $XYZ = 57.7^\circ$ (6mks)
- b) Given that $\sin \theta = \frac{3}{5}$ and $\tan \theta = \frac{3}{4}$. Find $\cos \theta$. (3mrks)
- c) Find the angles between 0° and 360° whose;
- \sin is -0.5736
 - \tan is 1.198
- (4mrks)
- d) A traditional stool has a triangular top which measures 27cm , 35cm and 42cm . Calculate area of the top. (3mrks)