



(Knowledge for Development)

KIBABII UNIVERSITY
UNIVERSITY EXAMINATIONS
2020/2021 ACADEMIC YEAR
SECOND YEAR SECOND SEMESTER
SPECIAL/SUPPLEMENTARY EXAMINATION
FOR THE DIPLOMA IN EDUCATION
MATHEMATICS

COURSE CODE: EDM 106

COURSE TITLE: TRIGONOMETRY, GEOMETRY AND VECTORS I

DATE: 29/9/2021

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) Find the volume of a triangular-based prism of sides 10cm, 7cm and 13cm
and length 28cm (4mrks)
- c) Given the vectors $A = 4i + 5j - 6k$ and $B = i + 6j + 4k$. find (4mrks)
- i. $A \cdot B$
ii. $A \times B$
- d) A quadrilateral $PQRS$ is transformed into $P^1Q^1R^1S^1$ by a translation
(1,2), $Q(3,4)$, $R(7,4)$, $S(2,5)$. The image of P^1 is (4,0).
Find the coordinates of $Q^1R^1S^1$ (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 triangle PQR , angle $PQR = 143.7^\circ$ $QR = 10$ and $PQ = 12$. Find PR . (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;
- i. Find the values of x that satisfy the equations $2 \cos \frac{1}{2}x = \sin x$
ii. State the amplitude and period in each case. (16mrks)

QUESTION THREE (16mks)

- a) Verify that (3,5) lie on the circle $x^2 + y^2 - 8x - 2y = 0$. Then find the
equation of the tangent at this point. (10mrks)
- b) Find the equation of a common chord of the circles
 $x^2 + y^2 - 4x - 2y + 1 = 0$ and $x^2 + y^2 + 4x - 6y - 10 = 0$ (3mrks)
- c) Find the equation of the circle with center (-3,4) and radius 5 (3 mrks)

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 $D(1,2)$. Show that $ABCD$ is a trapezium. (2mrks)

QUESTION FIVE (16mks)

- a) Solve triangle ABC in which $AC = 16.4\text{cm}$, $z = 5\text{cm}$ and angle $A = 22^\circ$ and angle $B = 126^\circ$. Hence find the area of the triangle (10mks)
- b) Find the angles between 0° and 360° whose;
- \sin is 0.8071
 - \cos is -0.71
 - \tan is -0.5773 (6mrks)