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*(Knowledge for Development)*

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

**COURSE CODE:** EDM 107

**COURSE TITLE:** TRIGONOMETRY, GEOMETRY AND VECTORS II

**DATE:** 28/9/2021

**TIME:** 8 AM -10 AM

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**INSTRUCTIONS TO CANDIDATES**

Answer Question One and Any other TWO Questions

TIME: 2 Hours



### QUESTION ONE (28 marks)

- a) Find the locus of a point  $p$  whose distance from point  $A(-1,2)$  is twice its distance from origin (3mks)
- b) Use a ruler and a compass to construct triangle  $PQR$  with measurements  $PQ = 8\text{cm}$ ,  $PR = 7.5\text{cm}$  and angle  $QPR = 60^\circ$  (3mks)
- c) A boy is  $1.5\text{m}$  tall and  $8\text{cm}$  from a tree finds the angle of elevation to the top of the tree is  $38^\circ$ . Find the height of the tree by scale drawing (4mks)
- d) In the triangle  $ABC$ ,  $AB = 12\text{cm}$ ,  $BC = 10\text{cm}$  and angle  $ABC = 143.7^\circ$ . Find  $AC$ . (4mks)
- e) Show that the points  $A(1,3,5)$ ,  $B(4,12,20)$  and  $C(3,9,15)$  are collinear (4mks)
- f) Find the volume of a triangular-based prism of sides  $10\text{cm}$ ,  $7\text{cm}$  and  $13\text{cm}$  and length  $25\text{cm}$  (4mks)
- g) The base radii of two similar cones are  $6\text{cm}$  and  $8\text{cm}$ . If the volume of the smaller cone is  $324\text{cm}^3$ . Find the volume of the larger one (3mks)
- h) Find the dot product of  $4i + 5j - 6k$  and  $i + 6j + 4k$  (3mks)

### QUESTION TWO (16mks)

- a) Find the surface area of a pyramid with a rectangular base of  $6\text{cm}$  by  $4\text{cm}$  and a height of  $9\text{cm}$  from the apex to the center of the base. (10mks)
- b) Calculate the volume of a cone whose height is  $12\text{cm}$  and length of slant height is  $13\text{cm}$  (3mks)
- c) An open cylindrical box was covered with tiles all over. If the radius of the box was  $4\text{cm}$  and height  $10\text{cm}$ . what is the area of the tiles that were used to cover the box. (3mks)

### QUESTION THREE(16mks)

- a) Find the equation of the angle bisectors that form the line  $3x - 4y + 3 = 0$  and the coordinate axes (10mks)
- b) Find the equation of the locus of a point  $p$  which moves so that it is equidistant from two fixed points  $A$  and  $B$  whose coordinates are  $(3,2)$  and  $(5,-1)$  (4mks)
- c) Divide  $PQ$   $15\text{cm}$  in the ratio  $2;3$  (2mks)

### QUESTION FOUR (16mks)

- a) Village  $A$ ,  $B$  and  $C$  are such that  $B$  is on a bearing of  $120^\circ$  from  $A$  at a distance of  $4\text{km}$ .  $C$  is  $6\text{km}$  from  $B$  on a bearing of  $240^\circ$ . Using a scale of  $1\text{cm}$  rep  $1\text{km}$  find;
- The distance of  $C$  from  $A$
  - The true bearing and compass bearing of  $C$  from  $A$
  - The compass bearing of  $A$  from  $C$
- (10mks)



- b) Define ;
- i. Scale of a map
  - ii. Compass bearing
  - iii. True bearing
- (3mks)
- c) The scale of a map is given as 1; 250,000. Find the actual distance in *km* represented by a length of 2*cm* on the map (3mks)

**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) Solve the equation  $\sin x = 0.8071$  for  $x$   $0 \leq x \leq 360$  (2mks)
- c) Find the point of intersection of the vectors (4mks)
- $$A = i + j + t(3i - j) \text{ and } B = -i + s(j)$$
- d) Find the scalar projection of  $(2,4, -2)$  onto  $(3,3,4)$  (4mks)