

TECHNICAL UNIVERSITY OF MOMBASA Faculty of Applied & Health

Sciences

DEPARTMENT OF MATHEMATICS & PHYSICS

CERTIFICATE IN BUILDING & CIVIL ENGINEERIG (CBCE)

AMA 1102: GEOMETRY

END OF SEMESTER EXAMINATION SERIES: DECEMBER 2013 TIME ALLOWED: 2 HOURS

Instructions to Candidates:

You should have the following for this examination - Mathematical tables

- Scientific Calculator

This paper consist of **FIVE** questions

Answer question **ONE (COMPULSORY)** and any other **TWO** questions Maximum marks for each part of a question are as shown

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Question One (Compulsory)

- **a)** Explain the meaning of the following angles:
 - Complementary angles (i)
 - **Reflex** angles (ii)
 - Acute angles (iii)
- **b**) The figure below shows a circle ABCDE. The line FEG is a tangent to the circle at point E. Line DE is parallel to CG, \angle DEC = 28° and \angle AGE = 32°.

 $\begin{array}{ccc} \angle & \angle \\ \text{Calculate} & \text{AEG and} & \text{ABC} \end{array}$

- c) Calculate the height of a tree of a person is 1.84m tall and is standing 16m away from the foot of the tree, if the angle of elevation from his eye is 20° (3 marks)
- **d)** A pyramidal frustum has a square top and bottom with lengths 6cm and 10cm respectively. The slant height of the frustum is 12cm. If the frustum is open at both ends, calculate the surface area.

e) Calculate all the angles in a triangle whose length are 5.5cm, 4.2cm and 3.8cm (4 marks)

		x° , $(2x-50^{\circ})$, $2x$, $(2x-10)$, $(x+40)$	
f) A p	entagon has the following interior angles		, calculate:
(i)	The value of x		(4 marks)
(ii)	All he interior angles		(4 marks)
(iii)	All the exterior angles		(4 marks)

Question Two

$$\theta \qquad 0 \le 0 \le 360^{\circ} \qquad 2\sin\frac{2}{2}\theta + \sin 2\theta - 1 = 0$$
a) Solve for such that and (5 marks)

b) For the following trigonometric graphs, state the wave length amplitude and phase angle.

 $Y = -\sin(3x + 60^{\circ})$ (i) (2 marks) $Y = \sin\left(\frac{1}{2}x + 10^{\circ}\right)$ **(ii)** (2 marks) $y = 3\cos(x + 40^{\circ})$ (iii)

(3 marks)

(4 marks)

(4 marks)

c) A stool is made by shaping a tree stump into a conical frustum of vertical height 60cm. If the top $\pi = 3.142$ radius is 12cm and the bottom one is 24cm, calculate the surface area of the stool. (Take)

(9 marks)

Question Three

a) Draw a triangle ABC with AB=BC = 5.4cm. AC = 6.8cm. Draw the inscribed circle for triangle ABC and measure its radius. (8 marks)

$$AB = \begin{pmatrix} 2 \\ 3 \end{pmatrix} BC = \begin{pmatrix} -2 \\ 4 \end{pmatrix}$$

d) Given that vectors and find:

$$AB + BC$$

(i) (2 marks)

$$\frac{1}{2}BC$$

(ii) (2 marks)
(iii) classify the turning points of (15 marks)

$$y = (x^2 + 1)(x^3 + 2x) \frac{dy}{dx}$$

(iv) Given (5

marks)

Question Four

$f(x) = \frac{1}{2x}$	
a) Differentiate from first principles	(8 marks)
$\frac{dy}{dx} \qquad y = 1 + \frac{1}{x} + \sqrt[3]{x^2 - 2}$	
b) Find of:	(8 marks)

 $S = 0.3t + 0.6t^2 - 0.02t^{\frac{5}{2}}$

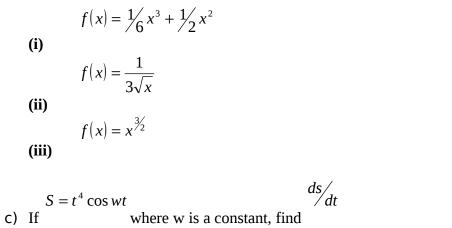
c) The displacement, s(metres) of a particle at time t (seconds) is given by Find its velocity at time t = 3 seconds (4 marks)

Question Five

a) The rate of increase of radius of sphere is 0.5mm per second. Find rate of increase of volume of the sphere when radius is 30cm. (8 marks)

f''(x)

b) Find



(6 marks)

(6 marks)