

KENYA METHODIST UNIVERSITY
END OF FIRST TRIMESTER 2007 EXAMINATIONS

FACULTY : **SCIENCES**
DEPARTMENT : **MATHEMATICS AND COMPUTER SCIENCE**
COURSE CODE : **MATH 001**
COURSE TITLE : **GENERAL MATHEMATICS**
TIME : **3 HRS**

Instructions:

- Answer question 1 (compulsory) and any other 2 questions in section B.

Question 1 (30 marks)

a) Solve for x in the following equations:

i) $\frac{x}{x+2} = \frac{1}{2}$ (2 mks)

ii) $\frac{x+1}{3} - \frac{x+2}{7} = 5$ (4 mks)

b) Use the factor method to solve for x in the following quadratic equation

$16x^2 - 8x + 1 = 0$ (4 mks)

c) Simplify:

i) $(3 + 5i) - (-2 + 3i)$ (2 mks)

ii) $\frac{2 - 3i}{4 - 3i}$

d) Three coins are tossed at the same time.

i) What is the sample space of this experiment?

ii) Determine the probability of getting two tails and one head. (3 mks)

e) Convert:

i) 210° to radians

ii) $\frac{2}{9}\pi$ to degrees

f) A ladder 5m long is placed against a vertical wall with its foot 3m from the wall.

i) Determine the vertical distance from the ground to the point where the ladder touches the wall.

ii) The foot of the ladder is now pulled 1 m further from the wall. Determine the drop in the vertical distance. (4 mks)

g) The first term of an AP is 5, the last is 19 and the sum is 84. Find the number of terms and the common difference. (3 mks)

SECTION B

Question 2 (20 marks)

a) Given the matrices:

$$A = \begin{bmatrix} 3 & -1 \\ -2 & -1 \end{bmatrix} \text{ and } B = \begin{bmatrix} 4 & -1 \\ 3 & -2 \end{bmatrix}$$

i) Determine A-B and A + 2B (3 mks)

ii) Show that $A^T + B^T = (A + B)^T$ (4 mks)

b) i) Determine the inverse of the matrix $A = \begin{bmatrix} -3 & 1 \\ 2 & 3 \end{bmatrix}$ (2 mks)

ii) Hence solve the following simultaneous equation

$$y - 3x + 5 = 0$$

$$2x + 3y + 4 = 0$$

(4 mks)

c) Solve by row operations

$$x - 2y - 3z = -1$$

$$2x + y + z = 6$$

$$X + 3y + 2z = 13$$

(6 mks)

Question 3 (20 marks)

a) Solve the following inequalities

i) $2x + 3 > 5$ (2 mks)

ii) $|3x + 6| \leq 18$ (3 mks)

b) Find the inverse of the function: $f(x) = 5x - 8$ (3 mks)

c) Use the elimination method to solve the following system equations.

$$x + 2y = 4$$

$$y - 2 = 7 + 3x$$

(4 mks)

d) A cone 30cm high and a base diameter 18cm is cut by a plane parallel to the base and 12 cm from the base. Determine the volume of the frustrum. (8 mks)

Question 4 (20 marks)

a) Solve by substitution

$$y = 2x$$

$$2y = 4x^2 - 2$$

(3 mks)

b) Determine the difference between simple interest and compound interest on Ksh.1, 000 at 5% for 3 years. (4 mks)

c) If $\sin \theta = 0.5$, find the value of $\cos \theta$ and $\tan \theta$ without using tables or a calculator. (3 mks)

d) In triangle ABC; $a = 7\text{cm}$, $\angle B = 34^\circ$ and $\angle C = 44^\circ$. Determine the length of side b to 2 d.p. (5 mks)

e) To determine the height of a safaricom transmission tower in Meru, a surveyor observes the top of the tower from two points A and B on opposite sides of the tower. The angles of elevation of the top of the tower from A and B are 45° and 35° respectively. If the distance AB is 1088 meters and the observing points are 2 meters above the ground, determine the height of the tower. (5 mks)