

KENYA METHODIST UNIVERSITY
END OF SECOND TRIMESTER 2006/2007 EXAMINATIONS

FACULTY : **SCIENCES**
DEPARTMENT : **MATHEMATICS AND COMPUTER SCIENCE**
COURSE CODE : **MATH 100**
COURSE TITLE : **MATHEMATICS**
TIME : **3 HRS**

Instructions:

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

Question 1 (30 marks)

- a) i) Define the distance between 2 points A and B on the coordinate line. (1 mk)
ii) Let A and B have coordinates $(-6,-1)$, find $d(A, B)$. (1 mk)
- b) Let $A = \{2,4,6,8,9,12\}$
 $B = \{x_0 : 1 \leq x \leq 11, x \in N\}$
Find
i) $n(A \cup B)$
ii) $n(A \cap B)$ (2 mks)
- c) Solve for x
i) $\log_2(x+2) = \log_2 x + 1$ (3 mks)
ii) $\frac{2x-1}{3x+1} < 2$ (4 mks)
iii) $2^x = 7$ (3 mks)
- d) given that $f(x) = \frac{2}{x} - 3$, $g(x) = 3x + 4$ find:
i) $g \circ f^{(-2)}$ (3 mks)
ii) $f \circ g(3)$ (3 mks)
- e) The sixth term of GP is 27 and the common ratio $r=3$. Find the first term and the sum of the first 8 terms of this GP. (4 mks)
- f) Find the horizontal and vertical asymptotes of:

$$y = \frac{x^2 - 2x - 8}{x - 1} \quad (2 \text{ mks})$$

SECTION B

Question 2 (20 marks)

- a) Solve the following system by row operations
 $5z - 5y + 2x = 17$
 $x - 2y + 3z = 9$
 $3y - x - z = -6$ (6 mks)
- b) Find the domain and the range of the function:
 $f(x) = \frac{3x^2 - 2}{x^2 - 7x + 12}$ (3 mks)
- c) Find the amount which would be obtained if Ksh.100, 000 is deposited into an account in which compounding is done every month for a period of 2 years at 3%. (3 mks)
- d) Solve by completing the square: $2x^2 + 3x - 1 = 0$ (4 mks)
- e) Solve for x if $2^{3x-1} = 6^{2x-5}$ (4 mks)

Question 3 (20 marks)

- a) In a class there are 10 girls and 15 boys. In how many ways can a team of 8 be chosen if both sexes are equally represented? (3 mks)
- b) Solve for x in the following:
- i) $2x^2 + 7x < 4$ (4 mks)
- ii) $\text{Log}_3(x-1) + \log_3 x = 2$ (3 mks)
- iii) $|4x - 3| \leq 5$ (3 mks)
- c) Find the inverse of the function:

$$f(x) = \frac{3x+4}{5x-2} \quad (2 \text{ mks})$$

- d) i) Define the inverse of a matrix. (2 mks)
- ii) Find the inverse of the matrix $A = \begin{bmatrix} -5 & 3 \\ 8 & 6 \end{bmatrix}$ (2 mks)

Question 4 (20 marks)

- a) i) How does the graph of $y = (x-2)^2$ differ from the graph of $y = x^2$. (2 mks)
- ii) Define the vertical shift of a graph $y = f(x)$ by 3 units. (2 mks)
- b) What rate of interest will yield Ksh.1000 on a principle of Ksh.800 in 5 years? (3 mks)
- c) Solve for x if:
- i) $x^2 - \frac{2}{3}x + \frac{1}{9} = 0$ (3 mks)
- ii) $3^{2x-1} = \frac{1}{81}$ (3 mks)
- d) Find 3 numbers in arithmetic sequence such that the sum of the first and third is 12 and the product of the first and second is 24. (3 mks)
- e) The third term of a geometric sequence is 144 and the 6th is 186. Find the sum of the first 10 terms of the sequence. (4 mks)