

Mount Kenya



University

UNIVERSITY EXAMINATION 2014/2015

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS, STATISTICS AND ACTUARIAL SCIENCE

BECF/BCOM/BBM/BEDA/BAS/BECS/BEC

REGULAR

UNIT CODE: BMA1103

UNIT TITLE: BUSINESS
MATHEMATICS

DATE: DECEMBER 2014

MAIN EXAM

TIME: 2 HOURS

Instructions: Answer all questions in Section A and any other two questions in Section B

SECTION A:

QUESTION ONE

- a) Solve by completing the square $x^2 - 3x - 18 = 0$ (4mks)
- b) Given the Universal set $U = \{1, 2, 3, 4, 5, 6, 7, 8\}$ and
 $A = \{1, 2, 6, 7\}$, $B = \{2, 3, 4, 7\}$, $C = \{4, 5, 6, 7\}$ establish the sets
- i. $A \cap (B \cup C)$ (2mks)
- ii. $B \cup C$ (2mks)
- iii. $B \cap C$ (1mks)
- c) In a school where 36 study foreign languages, 26 study French, 18 study German, 11 study French and German, 10 study French and

Latin, 6 study German and Latin, and 4 study French, German and Latin.

- i. Represent the above information in a Venn diagram (4mks)
 - Find
 - ii. The number who study French and German but no Latin (2mks)
 - iii. The number who study Latin (2mks)
 - iv. The number who study at least two languages (2mks)
- d) Solve the following simultaneous equations (4mks)

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

$$3x + 2y - 1 = 0$$

- e) In an arithmetic progression, the thirteenth term is 27 and the seventh term is three times the second term. Find the first term, the common difference and the sum of the first ten terms. (5mks)
- f) Show that $2x^3 + x^2 - 13x + 6$ is divisible by $x - 2$, and hence find the other factors of the expression. (2mks)

SECTION B

QUESTION TWO

- a) Given that $\log_5 2 = 0.4307$, $\log_5 3 = 0.6826$ and $\log_5 7 = 1.2091$
Evaluate
- i. $\log_5 24$ (3mks)
 - ii. $\log_5 \frac{63}{6}$ (3mks)
- b) Solve the following pair of simultaneous equations (4 mks)
- $$2x - y + 2 = 0$$
- $$4x + y - 5 = 0$$

- c) Find the range of values for which the following inequality is true and indicate the solution on the number line. (4 mks)

$$|3x - 4| \leq 5$$

- d) A bank account is earning interest at 6% per year compounded continuously.
- By what percentage has the bank balance in the account increased over one year? (2mks)
 - How long does it take the balance to double? (4mks)

QUESTION THREE

- Solve $8x^2 - 24x + 18 = 0$ using the formula method. (4 mks)
- Give n the series 5, 16, 27, 38, 49,
 - Find the twenty-third term of the series (3 mks)
 - Find the sum of the first 150 terms (3mks)
- Mr Omar is a part owner of a newly formed toy company. His monthly salary consists of a US \$ 200 plus 10% of the company's net revenue for that month.
 - Write an equation expressing his monthly salary S in terms of the company's net revenue R (2mks)
$$S = 200 + 0.1R$$
 - Draw a graph of his monthly salary for net revenue up to US \$ 20,000 (6mks)
 - If the company's net revenue for a certain month was US \$ 15,000 what was Mr. Jordan's salary? (2mks)

QUESTION FOUR

- Mr. Wanjau offers to pay Amani Furniture's either Ksh 1 million in four yearly instalments of Ksh 250,000 each starting now or simply paying then a lumpsum amount of Ksh 920,000 now. Assuming a 6% interest rate compounded continuously which option should Amani Furniture's choose? (7 mks)

d) Determine

$g \circ f(-2)$ if $f(x) = 2x - 3$ and $g(x) = x^2 - 2x + 3$ (4mks)

a) Consider the following universal set T and its subjects C, D and E

$$T = \{a, b, c, d, e, f, g, h, i, j\}$$

$$C = \{d, e, g, i\}$$

$$D = \{a, c, f, h, j\}$$

$$E = \{a, e, f, h\}$$

$$F = \{b\}$$

Find and present the sets above in a Venn-diagram

i) $D \cap E$ (2 mks)

ii) $C \cap D \cap E$ (2mks)

iii) $C \cap F$ (2mks)

e) A die is thrown. Find the probability of getting an even number or a three (3mks)

QUESTION FIVE

a) Given points $(-4, 3)$ and $(5, 10)$, find the equation of the straight line that passes through them. (3 mks)

b) Find the equation of a line that is perpendicular to $y = -3x + 7$ and passes through the point $(3, -2)$. (3 mks)

c) Solve the following quadratic equation by factorization. (4 mks)
 $2x^2 + 9x + 4 = 0$.

d) A small business sells KSh 10,000 worth of products during its first year. The owner of the business has set a goal of increasing annual sales by Ksh 7500 each year for 9 years. Assuming that this goal is met, find the total sales during the first 10 years this business is in operation. (5 mks)

e) Find the value of a in the expression $x^3 - 3x^2 + ax + 5$ has remainder 17 when divided by $x - 3$ (3mks)

f) If $f(x) = 2x^3 - 5$ and $g(x) = x^2$ find $f(g(x))$ (2mks)

$a = 10000$