

UGANDA MARTYRS UNIVERSITY

UNIVERSITY EXAMINATIONS

FACULTY OF SCIENCE

DEPARTMENT OF MATHEMATICS

END OF SEMESTER FINAL ASSESSMENT

SEMESTER I August 2022/23 Intake (Nkozi Main Campus)

FIRST YEAR EXAMINATIONS FOR BACHELOR OF BUSINESS

ADMINISTRATION AND MANAGEMENT

(BAM I NKOZI CAMPUS)

Fundamentals of Mathematics

FOM 1101

DATE : 14th December 2022

TIME : 9:30 AM - 12:30 PM

DURATION: 3 Hrs

Instructions

1. *Carefully read through ALL the questions before attempting.*
 2. ANSWER FOUR (4) Questions (All questions carry equal marks).
 3. *Ensure that your **Reg. number** is indicated on all pages of your work.*
 4. *Ensure that your work is **clear** and **readable**. Untidy work will be penalized.*
 5. *Any type of **examination Malpractice** will lead to automatic disqualification.*
 6. *Do not write anything on the question paper.*
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QUESTION ONE

(a) Write TRUE or FALSE.

(i) $P = 6$ if $729 = 3^P$.

[2 Marks]

(ii) $4 + X^5 = (4 + X)^5$

[2 Marks]

(iii) $\left(\frac{125}{27}\right)^{-\frac{1}{3}} = \frac{3}{5}$.

[2 Marks]

(iv) $\log_9 3 - 2\log_9 6 + \log_9 12 = 0$.

[2 Marks]

(v) $X = 3$ is a root of $X^2 - 5X + 6$.

[2 Marks]

(b) Solve for t

(i) $3^{2t+1} + 3 = 10(3^t)$.

[5 Marks]

(ii) $16^{2t-1} \times 4^{4t-2} = 32$.

[5 Marks]

(c) Solve for x in the equation

$$3 + \log_2(x - 5) = \log_2(3x + 4)$$

[5 Marks]

QUESTION TWO

(a) Simplify

(i) $\frac{s - t}{6s - 6t}$,

[2 Marks]

(ii) $\frac{b + c}{b^2 - c^2}$.

[2 Marks]

(b) Solve

(i) $\frac{x}{6} + \frac{(3x - 2)}{4} = \frac{(x + 5)}{8}$

[4 Marks]

(ii) $7(p + 3) = 9 - 3p$

[4 Marks]

(iii) $\frac{5}{3x} + \frac{5}{4x} = \frac{7}{12}$

[4 Marks]

(c) Make m the subject in the formula

$$S = \frac{3r}{2x - m} - 1.$$

[4 Marks]

(d) Given that

$$P = 4\pi\sqrt{\frac{R}{Q}},$$

find the value of Q when $R = 230$, $\pi = 3.142$ and $A = 12$

[5 Marks]

QUESTION THREE

(a) Solve the simultaneous equations

$$x - 3y = 5$$

$$3y + 2x = 10$$

[4 Marks]

(b) Solve the quadratic equations

(i) $3x^2 + 5x + 2 = 0$ by the quadratic formula.

[4 Marks]

(ii) $2y^2 - 14y + 20 = 0$ by completing the square.

[4 Marks]

(c) When ten times a number is reduced by 12, the result is equal to twice the square of the number. Find the number.

[4 Marks]

(d) Solve the simultaneous equations

$$6m + 9 = n$$

$$n = 2m^2 - 3m$$

[9 Marks]

QUESTION FOUR

(a) If $T = \begin{pmatrix} 4 & 2 \\ 5 & 1 \end{pmatrix}$ find the values of the

unknowns in $2 \begin{pmatrix} 2x & 4y \\ 3z & u \end{pmatrix} + 2T = 3T$

[4 Marks]

(b) The determinant of $A = \begin{pmatrix} 3r & 4 \\ 3 & r \end{pmatrix}$ is 0. Calculate the possible values of r .

[4 Marks]

(c) Find the determinant of

(i) $B = \begin{pmatrix} 3 & 2 & 1 \\ 3 & 2 & 1 \\ 1 & 0 & 2 \end{pmatrix}$

[4 Marks]

(ii) $N = \begin{pmatrix} 2 & 0 & 0 & 0 & 0 \\ 7 & 1 & 0 & 0 & 0 \\ -9 & 5 & 3 & 0 & 0 \\ 10 & 0 & 1 & 2 & 0 \\ 2 & 10 & 22 & 15 & 1 \end{pmatrix}$

[4 Marks]

(d) A poultry farm has 3 units A, B and C. Unit A produces 20 trays of eggs and 40 broilers every month. Unit B produces 30 trays of eggs and 50 broilers every month. Unit C produces 35 trays of eggs and 45 broilers during the same period. If a tray of eggs costs Shs. 9,000 and a broiler costs Shs. 15,000

(i) Represent the above information in matrix form of order 3×2 for eggs and broilers.

[2 Marks]

(ii) Form a 2×1 matrix for the eggs and broilers sold on the farm.

[2 Marks]

(iii) Use matrix multiplication to find the total sales of the farm if all eggs and broilers were sold.

[5 Marks]

QUESTION FIVE

(a) Differentiate with respect to the independent variable x

(i) $y = 4x^3 - 3x^2 - 2x + 12$ [2 Marks]

(i) $y = (x^4 + 5x)^3$ [2 Marks]

(ii) $y = e^{3x}(x^2 + 12)$ [2 Marks]

(iii) $f(x) = \frac{x^2}{3+x}$ [2 Marks]

(b) Find

(i) $\int 4x^3 - 3x^2 - 2x + 12 \, dx$ [2 Marks]

(ii) $\int \frac{(3x^2 - 3)}{x^3 - 3x} dx$ [3 Marks]

(ii) $\int_1^2 (\frac{2x}{x^2} + e^{2x}) dx$ [3 Marks]

(c) If $f(x) = x^2(3 - 2x)$ find the

(i) value of $f(x)$ when $x = 2$, [3 Marks]

(ii) gradient function $f'(x)$ [3 Marks]

(iii) slope for the graph of $f(x)$ at the point
where the x coordinate is 2. [3 Marks]

End