Elite
Media

MTH 101 (Business mathematics)
Exam past questions

RIVERS STATE UNIVERSITY

NKPOLU-OROWORUKWO, PORT HARCOURT

DEPARTMENT OF MATHEMATICS

Course Code: MTH 101 | Total Marks: 70marks
Course Title: Business Mathematics 1 | Credit Unit: 3
Departments: (MBBS, Nursing & Physiology) | Exam Hours: 02hrs
Semester: First Semester 2021/2022 Academic Session | DOE: 07/07/2022

Instruction: Attempt any Four Questions and show your Work Clearly, No Mobile Phone is allowed in the Examination Hall & Do all Rough Work inside your Answer Booklet.

Q1 (a) Obtain the simplest value of $\frac{(2^{2n}-3.2^{2n-2})(3^n-2.3^{n-2})}{3^{n-1}(4^{n+1}-2^{2n})}$ [10marks]

(b) Find the value of $\frac{\log\sqrt{27}+\log 8-\log\sqrt{1000}}{\log 1.2}$ [8marks]

Q2 (a) Solve the real value of x, $2^x.3^{x^2}=6$ [7marks]

(b) Minimize $f(x,y)=30x+50y$ using the graphical method

Subject to $3x+y\geq 15$

$x+2y\geq 12$

$3x+2y\geq 24$

$x\geq 0, y\geq 0$ [11marks]

Q3 (a) Solve the following [10marks]

(i) $\frac{x-4}{x+4}>1$ (ii) $2x^2-5x-3\leq 0$ (iii) $\frac{3x-4}{x+3}\leq 0$

(b) Solve the system of logarithmic equation [8marks]

$\log x+\log y=2, 2^{\log x}.3^{\log y}=\sqrt{54}$

Q4 Maximize $z(x_1,x_2,x_3)=3x_1+4x_2+2x_3$ using the Simplex method

Subject to $x_1-2x_2+4x_3\leq 36$

$3x_1+3x_2-5x_3\leq 40$

$3x_1+2x_2+x_3\leq 28$

$x_1,x_2,x_3\geq 0$ [17marks]

Q5 Solve the value of x from the relation, $9^x+33^x=121^x$ [17marks]

Q 6 Solve the system of equations for the unknowns

$\frac{2}{x}+\frac{3}{y}+\frac{1}{z}=4$

$\frac{3}{x}-\frac{5}{y}+\frac{2}{z}=-5$

$\frac{4}{x}-\frac{6}{y}+\frac{3}{z}=7$ [17marks]

RIVERS STATE UNIVERSITY

NKPOLU-OROWORUKWO, PORT HARCOURT

DEPARTMENT OF MATHEMATICS

Course Code: MTH 101 — Total Marks: 70marks

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Departments: (MBBS, Nursing & Physiology) — Exam Hours: 02hrs

Semester: First Semester 2021/2022 Academic Session — DOE: 07:07:2022

Instruction: Attempt any Four Questions and show your Work Clearly. No Mobile Phone is allowed in the Examination Hall & Do all Rough Work inside your Answer Booklet.

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DEPARTMENT OF MATHEMATICS/COMPUTER SCIENCE
RIVERS STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY,
NKPOLU – OROWORUKWO, PORT HARCOURT
FIRST SEMESTER EXAMINATION

MTH 101: TITLE: INTRODUCTION TO MATHEMATICS 1, UNIT 3
Instruction: Attempt any 4 question and show your work clearly Time: 3hrs

(a) Solve the simultaneous equation
$3x + 2y + 5z = 2$
$5x + 3y - 2z = 4$
$2x - 5y - 3z = 14$

(b) Using factorization method, find the root of the quadratic equation
$3p(2p - 1) - 17 = (2p - 5)^2$

(a) Graph, solve the inequalities and determine the shaded region
$3x + 2y \geq 12$
$x + 3y \geq 18$

(b) simplify $\frac{3^n - 3^{n-1}}{3^2 \times 3^n - 27 \times 3^{n-1}}$

(a) Solve the equations for x
i. $2^x + 2^{-x} = 2$
ii. $4^{x+1} - 9(2^x) = -2$

Given that $\log_8^n = \frac{1}{2p}$, $\log_n^{2n} = q$ and $q - p = 4$, find the value of n

(4) In a particular Bakery, two types of cakes X and Y are made by making use of two type of materials P and Q. The quantity of material used for each unit of cake, the total quantity of each type of material available and the profit in each cake in ₦ are shown in the following table.

	P	Q	Profit
X	3	2	2
Y	4	5	3
Quantity available	18	19	

a. Assuming that the bakery makes x units of X and y units of y, write down the four inequalities connecting x and y.
b. Find how many of each type of cake the Bakery should make in order to maximize profit.

The sum of three numbers is 27. The second number is three more than the first, while the third is twice the first, find the numbers.

(b) Demola is two years older than Deji and Tobi is half of Demola's age. The sum of their ages is 23. How old is Deji, Tobi and Demola?

(a) Find the distance between the pair of point $(3, 8)$ ... $(2, -5)$
(b) If $M = (x, 2x)$, $N = (2x, 1)$, $MN = \sqrt{2}$, Find the value of x
(c) Find, a if the slope of the line joining (-8, 11), (2, a) is $\frac{-4}{3}$

RIVERS STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY
NKPOLU – PORT HARCOURT
DEPARTMENT OF MATHEMATICS/COMPUTER SCIENCE

FIRST SEMESTER EXAMINATION,
MTH 101 (INTRODUCTION TO MATHEMATICS 1) TIME: 2HRS

INSTRUCTION: ANSWER ANY FOUR QUESTIONS

1 (a) The total supply S of a particular product at a certain price ₦p is given by the relation.
$S = 50p + 1000$
Find the total supply when the price is ₦4.

(b) In a manufacturing company, the total cost of production is given by
$C(x) = 30x^2 + 8x + 15$ and total revenue is given by
$R(x)\ 50x^2 - 12x + 40$
Determine the profit function.

Given that α and β are solutions of the equation $2x^2 - 3x + 1 = 0$, form the quadratic equation, with integral coefficients, whose solutions are $\alpha + 2$ and $\beta + 2$.

Using a scale of 1cm to 1unit on both x and y - axes, find the maximum value of the function.

$$f(x, y) = 10x + 8y$$

Subject to the constraints:

$$x + 2y \leq 12$$
$$2x + y \leq 14$$
$$x \geq 3$$
$$y \geq 1$$

4(a) Find the factors of $x^3 - (x + y)^3$

The polynomial $P(x) = 2x^3 + kx^2 + rx - 5$ leaves the remainder 8 when divided b
$x + 1$ and 35 when divided by $x + 2$.
Find the values of k and r.

Solve the equation

$$\log_2(x + 2) + \log_2(x + 6) = 5$$

Without using tables, simplify

$$\log_9 3 + \log_9 243 - 2\log_9 3$$

West Clinton

RIVERS STATE UNIVERSITY, PORT HARCOURT
DEPARTMENT OF MATHEMATICS
FIRST SEMESTER EXAMINATION, 2019/2020 SESSION

MTH 101: Introductory Mathematics I **Time: 2 hours**

Instructions: *Answer questions one and any other three
*Mobile phones are not allowed in this examination
*Do all rough works on your answer booklet

1a. Define a function and sketch the following functions on the same axis
(i). $y = x^3 - 3x^2 - 4x + 12$ (ii). $2x + y = 6$
b. Solve the simultaneous equation $x^2 + y^2 = 20;\ x - y = 2$

2a. Find the equations of the two lines through the point $(2, -1)$ making an angle of 45° with the line $y - 2x = 1$. Show also that these two lines are perpendicular to each other
b. Find the equation of the line through the point of intersection of the lines $x + y = 3$ and $2x - y = 6$ and parallel to another line $4x + 2y = 12$

3a. Define a linear programing problem.
b. A tailoring firm can produce two types of cloth A and B using sewing, cutting, and embroidery machines. The products yield a contribution of ₦3 and ₦2 respectively. The sewing machine has 14 hours capacity with each cloth unit using 1 and 2 hours respectively of this capacity. There are 10 hours available for the cutting machine with the cloth units using 1 hour each of this capacity. The embroidery machine is available for only 12 hours with each cloth unit using 3 and 1 hour respectively of the machine capacity. If the company wish to maximize its contribution:
(i). State all equations and inequalities describing the production process
(ii). Sketch these inequalities and show the feasible region on your answer booklet
(iii). How many of cloth A and B should be produced to maximize its contribution?
(iv). Calculate this maximum contribution

4a. If the roots of the equation $2x^2 + 6 = (x - 2)^2$ is α and β. Find
(i). $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$ (ii). $\frac{1}{\alpha^2} - \frac{1}{\beta^2}$
b. A floor is covered by a carpet which measures $5m$ by $4m$ and leaves a part of area $36m^2$ all around it. Find the width of the path

5. Prove that
(i). $1 + \cos^2 2x = 2(\cos^4 x + \sin^4 x)$
(ii). $\sin 7\theta + \sin\theta - 2\sin 2\theta \cos 3\theta = 4\cos^2 3\theta \sin\theta$

RIVERS STATE UNIVERSITY
NKPOLU-OROWORUKWO, PORT HARCOURT
DEPARTMENT OF MATHEMATICS

END OF FIRST SEMESTER EXAMINATION, 2021/2022 ACADEMIC SESSION

Course: MTH 101 (Introductory Mathematics) **Time**: 2hrs

Instruction: Answer Any Four (4) Question
DO NOT DO ANY ROUGH CALCULATIONS ON EITHER SIDE OF THIS QUESTION PAPER

1. (a) Given that $P(x) = 3x^2 + 4x + 1$, find the value of $P(2)$ **(7marks)**

(b) One root of the equation $2x^3 - 5x^2 - 28x + 15 = 0$ is -3
Find the other two roots. **($10\frac{1}{2}$ marks)**

2.(a) Determine the value of k such that the equation $x^2 + k^2x + 64 = 0$ has coincident roots **(6marks)**

(b) Without using tables, find the exact value of

$$\frac{\log\sqrt{27} + \log\sqrt{8} - \log\sqrt{125}}{\log 6 - \log 5}$$ **($11\frac{1}{2}$ marks)**

3.(a) If the total cost for a commodity is given by $C(x) = 1490x^2 + 48x + 75$, and the total revenue is given by $R(x) = 1580x^2 + 65x + 42$, where x is the unit of production, find the profit function **($11\frac{1}{2}$ marks)**

(b) Given that k and r are the roots of the equation $x^2 + 4x + 5 = 0$, find the value of $(\frac{1}{k^2} + 1)(\frac{1}{r^2} + 1)$ **(6marks)**

4.(a) If $3^x = (9^{x-1})(27)^{1-2x}$, what is the value of x? **(6marks)**

(b) The lines L_1 and L_2 are given by the equations $4x - 5y - 9 = 0$ and $3x - 2y - 1 = 0$ respectively.

(i) Determine the point Q at which L_1 intersects L_2 **(6 marks)**

(ii) Find the equation of the straight line PQ where P is the point with co-ordinates (2, 3) **($5\frac{1}{2}$marks)**

5.(a) If $2\cos\theta - 1 = -0.2854$, find the values of θ from 0° to 360° inclusive **(7marks)**

(b) Given that $\sin(x + 30°) = \cos(x + 30°)$, find the value of tan x **($10\frac{1}{2}$ marks)**

6.(a) Solve the equation below and represent your solution on the real line **(6marks)**

$$-15 \leq \frac{-12-6x}{3} \leq 2$$

(b) Using a scale of 1cm to 1 unit on both x and y axes, determine the maximum value of the function $f(x, y) = 10x + 8y$, subject to the following conditions:

$$x + 2y \leq 12$$
$$2x + y \leq 14$$
$$x \geq 3$$
$$y \geq 1$$

($11\frac{1}{2}$marks)

RIVERS STATE UNIVERSITY NKPOLU-OROWORUKWUO, P.M.B 5080, PORT HARCOURT
FACULTY OF SCIENCE, DEPARTMENT OF MATHEMATICS
UNDERGRADUATE PROGRAMME (B.Sc)

SEMESTER: *First Semester 2022/2023 Academic Session*
COURSE CODE/TITTLE: **MTH 111 (ALGEBRA AND TRIGONOMETRY 3C)**
Date: 16/06/2023 **Time: 3hours**
INSTRUCTIONS: *Answer five (5) questions and show all working where necessary. Each question carries 14 marks*

1a. If $0+1+2+\cdots+n=\frac{n(n+1)}{2}$, show that it holds for $n=0,k$ using the knowledge of mathematical induction 4marks.

1b. Given that $3x+5y+3z=1, -x+4y+2z=-10$ and $2x+5y+3z=-6$, find the values of x, y and z 10marks

2a. Find the determinant of matrix $K=\begin{pmatrix}1&3&2\\4&5&-1\\-3&2&0\end{pmatrix}$ 4marks

2b. Find 3K in 2a above 2marks

2c. If $z=\frac{2+i}{3+4i}$, express z in the form of a+ib. Hence, find (i). the modulus of z (ii). Argument of z (iii). Express z in polar form 8marks

3a. Given that $P=\begin{pmatrix}2&3&1\\4&5&-2\\-3&2&0\end{pmatrix}$ and $K=\begin{pmatrix}1&-2&3\\4&-1&5\\2&-3&-1\end{pmatrix}$ find P + K 3marks

3b. Resolve into partial fractions $\frac{5x-2}{x^2-3x-28}$ 8marks

3c. Find $\sin\theta$, $\cos\theta$ and $\tan\theta$ if $\varphi=140°$ 3marks

4a. If $A=\begin{pmatrix}a_{11}&a_{12}&a_{13}\\a_{21}&a_{22}&a_{23}\\a_{31}&a_{32}&a_{33}\end{pmatrix}$, find A^T 2marks

4b. Simplify without using table $\log(x^2+13x)=1+\log(1+x)$ 6marks

4c. Solve the equation $5^{2x}+1=26(5^{x-1})$ 6marks

5a(i). Simplify $3+\frac{1}{5-\sqrt{7}}$ and (ii). $3\sqrt{2}-\sqrt{32}+\sqrt{50}+\sqrt{98}$ 6marks

5b. In a group of 7 gentle men and 5 ladies, form a committee of 5 members in a way to include at least two ladies and one man 8marks

6a. Given that a universal set $U=\{x: x\ is\ a\ counting\ number\ from\ 1\ to\ 30\}$,
$A=\{Even\ numbers\ from\ 1\ to\ 30\}, B=\{Odd\ numbers\ from\ 1\ to\ 30\}$,
$C=\{2,6,7,9,37,48,1,19,18,24,27,\}$. Find (i). $A\cap C$, (ii). $B\cap C$, (iii). $A\cap B$, (iv). $A'\cap B'$ (v). $A\cap B\cap C$ 14marks

6b. If $B=\begin{pmatrix}2&3\\1&4\\-2&5\end{pmatrix}$ and $C=\begin{pmatrix}6&3&1\\2&4&7\end{pmatrix}$, find $B.C$ 4marks

7a. In a group of 120 students, 72 of them play football, 65 play table tennis and 53 play hockey. If 35 students pla both football and table tennis, 30 play both football and hockey. 21 play both table tennis and hockey, each of the students play at least one of the three games. Illustrate this information in a Venn – diagram. 3marks

7b. Find the 6^{th} term in the expression of $(2x+y)^9$ 5marks

7c. Simplify without using tables $(2+3i)(3-4i)$ and $\frac{1}{2}\log 25-2\log 3+\log 18$ 6marks

DR. C. NKUTURUM
COURSE LECTURER

GOOD SUCCESS!

Department of Mathematics,
Rivers State University, Nkpolu-Oroworukwo, Port Harcourt
First Semester Examinations 2022/2023 session
MTH 111 Algebra and Trigonometry

Instruction: Answer **FIVE** questions.

Time: 2 Hours

1a Let U be the universal set and $\mathcal{U} = \{1,3,4,5,7,9,10\}$, $A = \{1,4,5,10\}$, $B = \{3,4,7,9\}$, $C = \{1,3,5,9,10\}$. Find (i) $A' \cap B$ (ii) $(A \cup B)' \cap C$ (iii) $(C' \cap A) \cap B$ (iv) $A - B$ *(7 marks)*

1b In a survey of 450 out patients who reported at a hospital in a particular day, it was found that 400 complained of fever while 360 complained of stomach pain. The report also had it that some patients complained of both fever and stomach pain. (i) How many patients complained of both fever and stomach pain? (ii) After receiving treatment over a short interval of time, the number of patients who complained of fever reduced by 8% and those that had stomach pain reduced by 12%. How many patients neither took ill of both illnesses given that 150 patients had both illnesses. *(7 marks)*

a If α and β are the roots of the equation $(p-7)x^2 + px + 2p = 0$ where p is a constant, express $\alpha + \beta$ and $\alpha\beta$ in terms of p, hence or otherwise find the equation whose roots are (i) α^{-1} and β^{-1} (ii) Find the value of p for which the roots are equal. *(6 marks)*

b Solve the system $x - 7y + 2z = -6$, $5x - 5y + 3z = 2$, $-2x + y - z = -2$ using cramer's rule. *(8 marks)*

Determine the nature of the roots of the following equations and sketch the graph (i) $m^2 + 2m + 24 = 0$ (ii) $n^2 - 6n + 9 = 0$ (iii) $x^2 - 8x + 15 = 0$ *(6 marks)*

Use DeMoivre's theorem to evaluate $(1+i)^6$ hence express $\frac{(\sqrt{3}+i)(2i)^3}{(1+i)^6}$ in the form $x + iy$ *(8 marks)*

Resolve $\frac{7x+2}{(2x-3)(x+1)^2}$ into partial fractions. *(8 marks)*

If $cos2A = \frac{3}{13}$ find $tanA$ where A is acute. *(6 marks)*

Prove by mathematical induction that for all natural numbers, P_n, $n^3 + 2n$ is divisible *(8 marks)*

Expand $(1-2x)^{\frac{1}{2}}$ using the binomial theorem hence evaluate $\sqrt{0.96}$ to 4 decimal p *(6 marks)*

If $sinA = \frac{3}{5}$ and $cosB = \frac{5}{13}$ find $\sin(A+B)$ and $\cos(A+B)$ when (i) A and B are acute (ii) A obtuse and B is acute. *(8 marks)*

Find the general solution of the equation $4sec^2\theta = 3tan\theta + 5$. *(6 marks)*

Convert $\frac{1+i\sqrt{3}}{\sqrt{3}+i}$ to polar form and perform the indicated operation leaving your answer in th form $x + iy$. *(7 marks)*

Find the values of λ for which the roots of the equation $x^2 - (3\lambda + 1)x + \lambda^2 - 1 = 5\lambda$ ar real. *(7 marks)*

RIVERS STATE UNIVERSITY, PORT HARCOURT
DEPARTMENT OF MATHEMATICS
FIRST SEMESTER EXAMINATION, 2019/2020 SESSION

MTH 101: Introductory Mathematics 1 **Time: 2 hours**

Instructions: ***Answer questions one and any other three**
***Mobile phones are not allowed in this examination**
***Do all rough works on your answer booklet**

1a. Define a function and sketch the following functions on the same axis
(i). $y = x^3 - 3x^2 - 4x + 12$ (ii). $2x + y = 6$
b. Solve the simultaneous equation $x^2 + y^2 = 20;\ x - y = 2$

2a. Find the equations of the two lines through the point $(2, -1)$ making an angle of $45°$ with the line $y - 2x = 1$. Show also that these two lines are perpendicular to each other
b. Find the equation of the line through the point of intersection of the lines $x + y = 3$ and $2x - y = 6$ and parallel to another line $4x + 2y = 12$

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(iii). How many of cloth A and B should be produced to maximize its contribution?
(iv). Calculate this maximum contribution

4a. If the roots of the equation $2x^2 + 6 = (x - 2)^2$ is α and β. Find
(i). $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$ (ii). $\frac{1}{\alpha^2} - \frac{1}{\beta^2}$
b. A floor is covered by a carpet which measures $5m$ by $4m$ and leaves a part of area $36m^2$ all around it. Find the width of the path

5. Prove that
(i). $1 + \cos^2 2x = 2(\cos^4 x + \sin^4 x)$
(ii). $\sin 7\theta + \sin\theta - 2\sin 2\theta \cos 3\theta = 4\cos^2 3\theta \sin\theta$

RIVERS STATE UNIVERSITY, PORT HARCOURT
DEPARTMENT OF MATHEMATICS
END OF 1ST SEMESTER EXAMINATION 2020/2021 ACADEMIC SESSION
Course: MTH 101 (Introductory Mathematics I) Time: 2hrs

Instruction: Answer any Four (4) Questions
(Do not do any rough calculations on any side of this paper)

1(a)(i) Using a scale of 1cm to 1unit on both x and y axes, shade the region satisfied by the following inequalities.

$$x + 2y \leq 6$$
$$x + y \leq 4$$
$$x \geq 1$$
$$y \geq 0.5$$

(ii) From your graph, determine the values of x and y that will maximize the function $f(x, y) = 8x + 5y$

(iii) What is the maximum value of $f(x, y)$

(b) The total revenue from the sale of x units of a product in a company is given by $P(x) = 4x + 200$. Calculate the total units of the product that must be sold so that the revenue will exceed #13,000

2(a) If $x^3 + 3ax^2 + bx + c$ is a perfect cube, prove that $b^3 = 27c^2$.

(b) At a particular price p, the quantity q supplied and demanded are given by

$$p = \frac{q}{40} + 10 \text{ and } p = \frac{8000}{q} \text{ respectively.}$$

Calculate the equilibrium price and equilibrium quantity

3(a) Find the number represented by x in the equation $\frac{7473^x}{4907} = \sqrt{942600}$

(b) Solve the equation $\log_5(x-2) - 2 = \log_5(3x-1) + \log_5\frac{1}{25}$

4(a) Using the method of elimination, solve the following equations simultaneously.

$$3x - y - 2z = 8 \quad \text{--- (a)}$$
$$x + 2y - z = -1 \quad \text{--- (b)}$$
$$-2x - 5y + z = -1 \quad \text{--- (c)}$$

(b) Find the value of $\log_7 9$

5(a) Calculate the shortest distance between the points A(7,9) and B(4, 5)

(b) A line PQ joins the point P(2,3) to the point of intersection of the lines $4x + 5y = 9$ and $3x - 2y = 1$. Find the equation of the line PQ.

(c) if α and β are the roots of $x^2 - 7x + 1 = 0$, find the equation whose roots are

$3 + \alpha$ and $3 + \beta$.

6(a) Given that $\sin^2\theta - 6\cos\theta = 3$, find the value of θ from 0° to 360° inclusive

(b) If $u = \frac{1-\sin x}{\cos x}$, prove that $\frac{1}{u} = \frac{1+\sin x}{\cos x}$

DEPARTMENT OF MATHEMATICS
RIVERS STATE UNIVERSITY
NKPOLU-OROWORUKWO, PORT HARCOURT

MTH111: Algebra and Trigonometry Examination Units:3 Date: Friday, June 16, 2023 Time: 2Hrs

INSTRUCTION: Attempt Any Four (4) QUESTIONS

1.(a) Let $B = \begin{pmatrix} 1 & 2 & 0 \\ 3 & -4 & 5 \\ 0 & -1 & 2 \end{pmatrix}$ *and let* $f(x) = x^4 - 3x^3 - 2x^2 + 4x + 6$. *Find* $f(B)$ [14 marks]

(b) Using determinants, solve the following systems of linear equations:

(i) $\begin{aligned} x - 2y &= 3z - 1 \\ 3y - 1 &= z - 2x \\ 8 - 5y &= 2z + 3x \end{aligned}$ (ii) $\begin{aligned} y + 3x &= 2z + 3 \\ 2 - 2x &= 3y + z \\ 2y + 3z &= x - 1 \end{aligned}$ [11 marks]

2.(a) Show that $z = 1 + i$ *and* $z = 1 - i$ *are both roots of* $z^4 + 4 = 0$, and hence write down the four roots of the equation. [13 marks]

(b) Simplify: (i) $\frac{1}{(3+i)^2} - \frac{1}{(3-i)^2}$ (ii) $\frac{(4-3i)(1+i)}{1+2i}$, expressing your result in both standard and polar forms. [12 marks]

3.(a) Express $\frac{5x^3+2x^2+5x}{x^4-1}$ as the sum of four partial fractions. [13 marks]

(b) Use the Binomial Theorem to calculate $(0.98)^8$ to four significant figures. [12 marks]

4. (a) Write down the formulae expressing $sinA \pm sinB$ *and* $cosA \pm cosB$ as products. Hence prove that $4cos\theta \cos\left(\theta + \frac{2\pi}{3}\right)\cos\left(\theta + \frac{4\pi}{3}\right) = cos3\theta$ [9 marks]

(b) *If* $tan\theta = \frac{a\sqrt{3}}{2b-a}$ *and* $tan\varphi = \frac{2a-b}{b\sqrt{3}}$, *find the value of* $(\theta - \varphi)$ *between* 0^0 *and* 360^0. [8 marks]

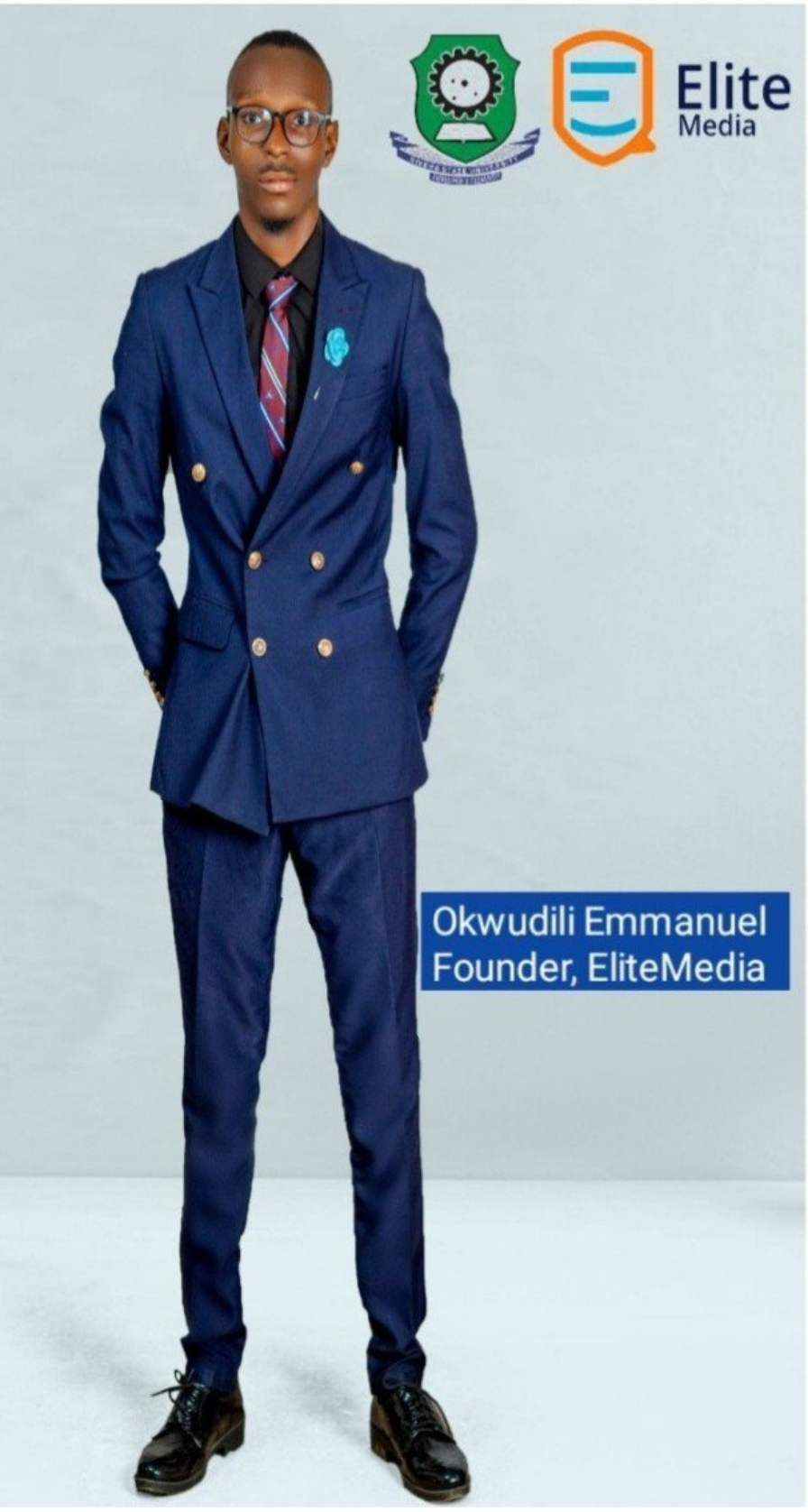
(c) Find the general solution of the equation $2sin^4\varphi + sin^2\varphi - 1 = 0$. [8 marks]

5. (a) A geometric progression and an arithmetic progression have each a first term of 32 and each a sixth term of 243. Find the common ratio of the geometric progression and the common difference of the arithmetic progression. The sum of the first six terms of the geometric progression can be written as $3^6 - 2^x$; *find* x. Find also the sum of the first eleven terms of the arithmetic progression. [17 marks]

(b) Interview indicates that each of the 4 Quantity Surveying students, 5 Chemistry students and 7 Geology Students who applied for scholarship in their respective disciplines qualified for the award. In how many ways can the selection be made be made (i) if only one scholarship is available in each of the disciplines? (ii) only two scholarships are available in each of the disciplines? [8 marks]

6. (a) The sets $\mathcal{V}$ *and* $\mathcal{W}$ *are subsets of the universal set* $\mathcal{U}$ *such that* $\mathcal{V} \subset \mathcal{W}$. Using Venn diagrams, illustrate the following sets: $(i)\mathcal{W} - \mathcal{V}$ $(ii)\mathcal{V}^c \cup \mathcal{W}$ $(iii)\mathcal{V} \cap \mathcal{W}^c$ $(iv)\mathcal{V}^c - \mathcal{W}^c$. *Hence from* (ii) *show that* $\mathcal{V}^c \cup \mathcal{W} = \mathcal{U}$ *and from* (iv) *show that* $\mathcal{V}^c - \mathcal{W}^c = \mathcal{W} - \mathcal{V}$ [12 marks]

(b) A survey by a cable TV provider in Port Harcourt, shows that in a sample of 1000 subscribers in Rivers State University, Nkpolu-Oroworukwo campus, 200 watch Arise TV, 240 Channels TV, 250 Zee World, 64 both Arise and Channels, 97 both Arise and Zee World, while 60 watch Channels and Zee World. If 430 do not watch Arise, do not watch Channels and do not watch Zee World, how many of the subscribers watch Arise, Channels and Zee World? [13 marks]



You don't have to be great to start, but you have to start to be great. -Zig Ziglar

My dear, I just want to remind you that you have started your journey to greatness and success is sure for you if you diligently follow the path of excellence.

Do your best and leave the rest for God, because I am sure that God, who began the good work within you, will continue his work until it is finally finished on tha day when Christ Jesus comes back again. Phil.1.6 (NLT)

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