BABCOCK UNIVERSITY

SCHOOL OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF BASIC SCIENCES

FIRST SEMESTER EXAMINATION, 2016/2017

COURSE CODE: MATH 101 COURSE TITLE: GENERAL MATHEMATICS 1

CREDIT UNITS: 3TOTAL MARKS: 60 TIME ALLOWED: 2 HOURS

INSTRUCTION: Attempt any **FOUR** questions

EXAMINERS: ADIO,A.K., KANU,R.U., AYINDE,S.A., BAMISILE,O.O., AKANBI,B.T.

QUESTION 1

At a Sport club with 63 members, 22 played Football, 25 played Basketball, 40 played Volleyball. 10 played Football and Basketball, 12 played Basketball and Volleyball, 15 played Football and Volleyball, 9 played Basketball only while 7did not play any of the three games.

a) Represent the above information using a Venn diagram (5 marks)

b) How many members played;

(i) Football and Basketball only (2 marks)

(ii) Only one game (2 marks)

(iii) Exactly two games (2 marks)

c) By simplification, show that $A \cap (A' \cup B) \cup B \cap (A' \cup B') = B$ where A and B are the subsets of the universal set μ (4 marks)

QUESTION 2

a) Prove that $(a^2 + b^2)x^2 - 3(a - b)x + \frac{9}{2} = 0$ has no real roots if $a + b \neq 0$

(5 marks)

b) Ifα *and* β are the roots of $2x^2 - x + 4 = 0$, find the values of;

(i) $\alpha^2 + \beta^2$ $(\alpha+\beta)^2 - 2\alpha\beta$ (2 marks)

(ii) $\alpha^3 + \beta^3$ $((\alpha+\beta)^2 + \alpha\beta - 3\alpha\beta$ (2 marks)

(iii) $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$ $(\alpha\beta)(\alpha+\beta)^2 - 2\alpha\beta$ (2 marks)

c) If α *and* β are the roots of $2x^2 + 3x - 2 = 0$, form a quadratic equation whose roots are α^2 *and* β^2 (4 marks)

QUESTION 3

a) Find the 5th term in the expansion of $(x^3 - \frac{7}{2x})^7$ (4 marks)

b) Expand $(x + 2y)^4$ in ascending powers of y. Hence, evaluate

$(1.02)^4$ (6 marks)

c) Find the first four terms of the expansion $(1-8x)^{\frac{1}{2}}$ in ascending powers of x. (5 marks)

QUESTION 4

a) In an Arithmetic progression; $a_5 = 1$ and $S_4 + S_{10} = 29$. Find the first term and the common difference. If $S_n = -120$; $find\ n$. (6 marks)

b) The third term of a geometric progression is 27 and its sixth term is 8, find the sum of the first six terms of the progression. (4 marks)

c) A woman is offered a position at a starting salary of N46,000 per annum with annual increase of N2,500. How much would her total earnings amount to, if she were to work 12 years under this salary schedule?. (5 marks)

QUESTION 5

a) State the principle of Mathematical Induction. (3 marks)

b) Prove by induction that;

(i)$5 + 10 + 15 + 20 + 25 + \cdots 5n = \frac{5n(n+1)}{2}$ (6 marks)

(ii) $\sum_{b=1}^{n}(b+1)2^b = n(2^{n+1})$ (6 marks)

QUESTION 6

a)(i) Use anti symmetric law to show that $A \cup B = B \cup A$ (3 marks)

(ii) Find the possible values of k if $x^2 + (k-3)x + 4 = 0$ has equal roots. (3 marks)

b) Show that; (i) ${}^nC_r = {}^nC_{n-r}$ (ii) ${}^nC_n = {}^nC_0$ (3 marks)

c) The second term of a geometric sequence is 24, the fifth term is 81. Find the seventh term. (3 marks)

d) Prove by mathematical induction that $8^n - 1$ is a multiple of 7 (3 marks)

BABCOCK UNIVERSITY

SCHOOL OF BASIC & APPLIED SCIENCES

DEPARTMENT OF BASIC SCIENCES

FIRST SEMESTER DEGREE EXAMINATION, 2015/2016

COURSE TITLE: GENERAL MATHEMATICS 1

COURSE CODE: MATH 101, **CREDIT UNITS:** 3

LECTURER: AYINDE, S.A., ADIO, A.K., AKANBI B.T.,KANU R.U. & BAMISILE,O.O.

TIME ALLOWED: 2HRS, **TOTAL MARKS:** 60

INSTRUCTION: Attempt any **FOUR** questions

QUESTION ONE

a) (i) Define a Set [2 marks]

(ii) Given a Set A= $\{a, b, c\}$. What are the possible subsets of the given Set? [3 marks]

b) In a Secondary School of 60 teachers, 30 teach Mathematics, 27 teach Physics and 21 teach Chemistry, 12 teach Mathematics and Physics but none teaches both Mathematics and Chemistry.

i. How many teach Chemistry and Physics?

ii. How many teach only Physics? [6 marks]

c) Let $\mu = \{x: 1 \leq x \leq 10\}$, with subsets A = $\{x: x \text{ is an even number}\}$, B = $\{x: x \text{ is an odd number}\}$. C = $\{x: x \text{ is a prime number}\}$

(i) Find the symmetric difference of A and C. [2 marks]

(ii) Find $\{(A \cup B) \cap C\} - B$ [2 marks]

QUESTION TWO

a) Let A and B be arbitrary non empty sets. Hence, show that $A \cap B = B \cap A$ [4 marks]

b) Simplify the following expressions:

(i) $A \cap (A' \cup B) \cup B \cap (A' \cup B')$ [3 marks]

(ii) $(A \cap B) \cup (A \cap B') \cup (A' \cap B) \cup (A' \cap B')$ [3 marks]

c) If A and B be two arbitrary non-empty finite sets, then show that

$$n(A \cup B) = n(A) + n(B) - n(A \cap B)$$ [5 marks]

QUESTION THREE

(a) (i) Use the method of completing the square to show that the solution to the given quadratic equation $ax^2 + bx + c = 0$, where a, b and c are constants is; $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ [4 marks]

(ii) Hence, use your result in part (i) or otherwise to solve the equation

$x^2 + 6x - 9 = 0$ [2 mark]

(b) Determine the possible values of k for which the quadratic equation

$9x^2 - 2(k+2)x + k = 0$ has equal roots. [4 marks]

(c) If α *and* β are the roots of the equation $4x^2 - 5x - 1 = 0$, find the quadratic equation whose roots are;

(i) $2 - \alpha$ *and* $2 - \beta$ [$2\frac{1}{2}$ marks]

(ii) α^2 *and* β^2 [$2\frac{1}{2}$ marks]

QUESTION FOUR

a) Show that ${}^{s}C_t = {}^{s}C_{s-t}$, If ${}^{s}C_t$ represents the number of combinations of t objects from s objects [3 marks]

b) (i) Expand $(3 - 4y)^3$ [3 marks]

(ii) Find the 6th term in the expansion of $\left(x^3 - \frac{1}{2x}\right)^7$ [4 marks]

c) Use Binomial theorem to find the value of $\frac{1}{\sqrt{0.95}}$ correct to 3 decimal places [5 marks]

QUESTION FIVE

(a) Find n, *where* $n > 0$, if the sum of the following Arithmetic Progressions are equal. $1,5,9,15, \ldots\ldots, nth$

$19,17,15,13, \ldots . nth$ [6 marks]

(b) Find the sum of the first six terms of a G.P whose 3rd term is 27 and whose 6th term is 8. [5 marks]

(c) Insert three arithmetic means between 9 and 25. Hence, determine arithmetic mean of the sequence. [4 marks]

QUESTION SIX

a) State the principle of Mathematical induction (2 marks)

b) Prove by induction that:

(i) $1 + 3 + 5 + \cdots + (2n - 1) = n^2$ [4 marks]

(ii) $9^n - 1$ is a multiple of 8 for all positive integers n. [4 marks]

c) Prove that $\sum_{r=1}^{n} r^2 = \frac{1}{6}n(n+1)(2n+1)$ for all positive integers n. [5 marks]

Babcock University; Illishan-Remo, Ogun State.

Department of Basic Sciences,

Mid-Semester Examination: Summer 2012/2013 Session.

MAT 101: General Mathematics I. Time Allowed: 45 Minutes.

Instruction: Answer **ALL** Questions.

1. At a Sports Club with 195 members, it was found that 90 played Lawn Tennis, 76 played Table Tennis, 67 Badminton, 35 played both lawn tennis and table tennis, 28 played both table tennis and badminton and 30 played both lawn tennis and badminton.35 didn't play any of the three games. (i) How many played all 3 games (ii) How many played lawn tennis only,(iii) How many played badminton and table tennis but not lawn tennis.

2. Prove by Mathematical Induction that the statement $S_n = \frac{n}{2}\{2a+(n-1)d\}$

$$1^2 + 2^2 + 3^2 + \ldots + n^2 = \frac{n(n+1)(2n+1)}{6}$$ is valid for all positive integers n.

3. Find the number of terms in an A.P whose first term is 5, common difference is 3 and the sum is 55.

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Babcock University; Illishan-Remo, Ogun State.

Department of Basic Sciences,

Mid-Semester Examination: First Semester 2012/2013 Session.

MAT 101 : General Mathematics I. (CT, Nursing & Agric) Students. Time Allowed : 45 Minutes.

Instruction : Answer Both Questions.

1. In a survey of Linguistic Students , 80 can speak Yoruba only , 90 can speak Igbo only ,100 can speak Hausa only , 50 can speak Hausa and Igbo , 45 can speak Yoruba and Igbo, 55 can speak Hausa and Yoruba while 35 can speak all the three languages. If 15 can speak none of the languages, how many of the students can speak (i) exactly one language (ii) exactly two languages. (iii) How many students took part in the survey .

2. Prove by Mathematical Induction that the statement

$$\sum_{r=1}^{n} \frac{1}{(3r-2)(3r+1)} = \frac{n}{3n+1}$$ is valid for all positive integers n.

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BABCOCK UNIVERSITY

DEPARTMENT OF BASIC SCIENCES

MID- SEMESTER EXAMINATION, 2013/2014 SESSION

COURSE TITLE: *MATH 101: General Mathematics 1*

LECTURER: *Ayinde, S.A*

INSTRUCTION: *Attempt all the questions* *Time Allowed: 30 mins.*

1. In a class of 60 students, 22 offered French, 22 offered English, 36 offered History; 8 offered French and English, 10 offered English and History, 12 offered French and History while 6 did not offer any of the three subjects. Find the number of students who offered (i) all the three subjects (ii) History only.

2. Prove by induction that $5+10+15+\ldots+5n=\frac{5n(n+1)}{2}$

3. If $\alpha and \beta$ are the root of $2x^2+4x+3=0$. Find the equation whose roots are $\alpha-1 and \beta-1$.

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FIRST SEMESTER, 2016/2017 ACADEMIC SESSION

MID-SEMESTER EXAMINATION. MATH101: General Mathematics

nstruction: Attempt any 3 questions. Time Allowed: 45min.

(1) In a community riot involving 100 persons, 42 men were shot in the head, 43 in the chest, 32 in the abdomen, 5 in the head and chest, 8 in the chest and the abdomen 6 in the abdomen and the head. How many were shot in all the three parts of the body?

(2) Prove by Mathematical induction that $1^3+2^3+3^3+\ldots+n^3=\dfrac{n^2(n+1)^2}{4}$.

$x^2+3(k+3)-\frac{9}{2}k=0$

(3) If the equation $x^2+3(k+3)x-9/2k=0$ has equal roots, find k.

(4) Insert four terms between 3 and 18 for an arithmetic progression

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BABCOCK UNIVERSITY

DEPARTMENT OF BASIC SCIENCES

MID- SEMESTER EXAMINATION, 2013/2014 SESSION

COURSE TITLE: *MATH 101: General Mathematics 1*

LECTURER: *Ayinde, S.A*

INSTRUCTION: *Attempt all the questions*

Time Allowed: 30 mins.

1. In a class of 60 students, 22 offered French, 22 offered English, 36 offered History; 8 offered French and English, 10 offered English and History, 12 offered French and History while 6 did not offer any of the three subjects. Find the number of students who offered (i) all the three subjects (ii) History only.

2. Prove by induction that $5+10+15+\ldots+5n=\frac{5n(n+1)}{2}$

3. If $\alpha and \beta$ are the root of $2x^2+4x+3=0$. Find the equation whose roots are $\alpha - 1 and \beta - 1$.

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BABCOCK UNIVERSITY

SCHOOL OF BASIC & APPLIED SCIENCES

DEPARTMENT OF BASIC SCIENCES

FIRST SEMESTER EXAMINATION, 2017/2018 SESSION

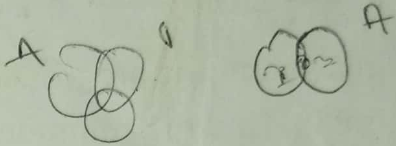
COURSE CODE: MATH 101 COURSE TITLE: GENERAL MATHEMATICS 1

CREDIT UNITS: 3 TOTAL MARKS: 60 TIME ALLOWED: 2 HOURS

INSTRUCTION: Attempt any **FOUR** questions

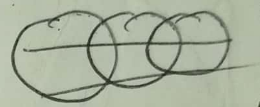
EXAMINERS: ADIO, A.K., KANU, R.U., AYINDE, S.A., BAMISHILE, O.O., AKANBI, B.T.

QUESTION 1



a) Let A and B be arbitrary finite sets

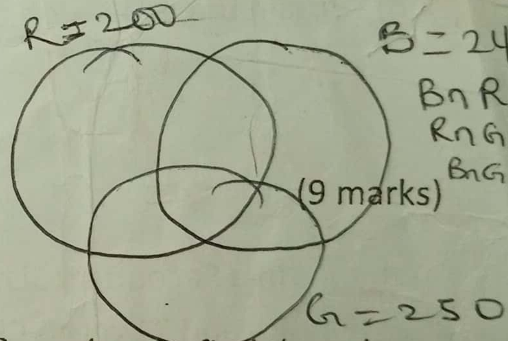
(i) Define Cardinality of A (2 marks)



(ii) Use a Venn diagram to show that

$n(A \cup B) = n(A) + n(B) - n(A \cap B)$ (4 marks)

b) In a sample of 1000 foodstuffs stores taken at Oshodi market, 200 of them stock Rice, 240 stock Beans, 250 stock Garri, 64 stock both beans and rice, 97 stock both Rice and Garri, while 60 stock Beans and Garri. If 430 do not stock Rice, do not stock Beans and do not stock Garri. Represent the information using a Venn Diagram. How many stores stock



$B = 24$

$B \cap R =$

$R \cap G =$

$B \cap G =$

(i) Rice, Beans and Garri?.

(ii) Rice and Garri only?

(iii) Rice only (9 marks)

QUESTION 2

a) If α *and* β are the roots of the equation $2x^2 - 3x - 4 = 0$, find the values of ;

(i) $\alpha + \beta$ (ii) $\alpha\beta$ (iii) $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$ (iv) $\frac{1}{\alpha+1} + \frac{1}{\beta+1}$ (v) $\alpha^3 + \beta^3$

($9\frac{1}{2}$ marks)

b) Find the possible values of p for which the quadratic equation $x^2 - 4x + 1 = p(x - 4)$ has equal roots. ($5\frac{1}{2}$ marks)

$b^2 = 4ac$

QUESTION 3

Use the principle of mathematical induction to prove the validity of the following series for all positive integers n

a) $\frac{1}{1.2}+\frac{1}{2.3}+\cdots\frac{1}{n(n+1)}=\frac{n}{n+1}$ (7 marks)

b) $\sum_{b=1}^{n} b(2b-1)=\frac{n(n+1)(4n-1)}{6}$ (8 marks)

QUESTION 4

a) If the sum of five numbers in an A.P is 25 and the sum of their squares is 165. Find the numbers. (5½ marks)

b) If $\frac{1}{y+kx}$, $\frac{1}{2y}$, $\frac{1}{y+kz}$ are in A.P., prove that k^2x , y , z are in G.P. (4 marks)

c) In a geometric progression, the first term is 7, the last term is 448 and the sum is 889. Find the common ratio. (5½ marks)

QUESTION 5

a) Obtain the first 4 terms of the expansion of $\left(1+\frac{1}{2}x\right)^{10}$ in ascending power of x. Hence, use your answer to find the value of $(1.005)^{10}$ correct to 4 decimal places. (10 marks)

b) Obtain the expansion of $(1+x-2x^3)^8$ as far as the term in x^3. (5 marks)

QUESTION 6

a) a) In a Secondary School of 60 teachers, 30 teach Mathematics, 27 teach Physics and 21 teach Chemistry, 12 teach Mathematics and Physics but none teaches both Mathematics and Chemistry. Represent the information on a Venn diagram and find the number of teachers that teach Physics only. (3 marks)

b) b) If α *and* β are the roots of the equation $2x^2+4x+5=0$. Find the quadratic equation whose roots are $\alpha-2$ *and* $\beta-2$ (3 marks)

c) c) Show that $\sum_{a=1}^{n} a(a+1)(a+2)=\frac{n(n+1)(n+2)(n+3)}{4}$ is true when $n=1$ (3 marks)

d) In how many ways can the letter of the word STATISTICS be arranged? (3 marks)

e) If $a-15, 10, a$ are in G.P., find the possible values of a. (3 marks)$\measuredangle$