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

(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)

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)