OLABISI ONABANJO UNIVERSITY, AGO-IWOYE

DEPARTMENT OF MATHEMATICAL SCIENCES

2005/2006 HARMATTAN SEMESTER EXAMINATION

COURSE CODE: MAT 101

COURSE TITLE: ELEMENTARY MATHEMATICS 1 Time: 2hrs

INSTRUCTION: •ANSWER FOUR QUESTIONS

1(a) The first two term of an A.P are -2 and 3. How many terms are needed for the sum to be equal to 306?

1(b) The first and the last term of G.P are 2 and 2048 respectively and the sum of the series is 2730. Find the number of term and the common ratio.

1(c) Expand $(x+3y)^6$ using binomial theorem and evaluate $(x+3y)^6$ at $x = 1$, $y = 0.01$

2(a) Given that A, B and C are non-empty sets, prove that

(i) $A \cup (B \cup C) = (A \cup B) \cup C$

(ii) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

2(b) In a class of twenty boys, sixteen plays hockey, ten plays soccer and two are not allow to play games. Find how many student that play

(i) Soccer and hockey

(ii) Hockey only

2(c) Expand $(1 + x + x^2)^3$ in power of x

3(a) show that if n is a positive integer

$$1 + 2 + 3 + 4 + \dots + n = \frac{n(n-1)}{2}$$

3(b) Show that for all positive integer value of $5^{2n} + 3n - 1$ is an integer multiple of 9.

3(c) Express in the form $a + ib$

(i) $(2 + 3i)^2$

(ii) $(2+i)(3+2i)(3-2i)$

4(a) State and prove De Moivre's theorem

(b) Given that $Z_1 = a + jb$; $Z_2 = c + id$

4(a) Evaluate in the form $a + ib$

(i) $\frac{1+i}{2-i}$

(ii) $\frac{3-4i}{5+2i}$

5(a) show that if $a > 0$, $y = ax^2 + bx + c$ has a minimum when $x = -b/2a$ and determine the minimum value

5(b) if α and β are the roots of equation $ax^2 + bx + c = 0$, given that

$$\alpha = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$$

$$\beta = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

Show that

(i) $\alpha + \beta = -b/a$

(ii) $\alpha\beta = c/a$