CHUKA   **UNIVERSITY**

SUPPLEMENTARY / SPECIAL EXAMINATIONS

FIRST YEAR EXAMINATION FOR THE AWARD OF BACHELOR DEGREE

MATH 101: FOUNDATION MATHEMATICS

STREAMS:

                                        TIME: 2 HOURS

DAY/DATE: MONDAY 16/11/2020   **5.00 P.M - 7.00 P.M.**

INSTRUCTIONS:
Answer All Questions.

QUESTIONS ONE: 30 MARKS

(a) Evaluate $\dfrac{3+\sqrt{5^2-3^2}+2^3}{1+(4\times6)\div(3\times4)} + \dfrac{15 \div 3 + 2 \times 7 - 1}{3\times\sqrt{4}+8-3^2 +1}$ (4 marks)

(b) Solve the equation $4(2r - 3) - 2(r - 4) = 3(r - 3) - 1$ (3marks)

(c) Solve simultaneously $\dfrac{1}{2a} + \dfrac{3}{5b} = 4$

        $\dfrac{4}{a} + \dfrac{1}{2b} = 10.5$ (4 marks)

(d) Solve $2x^2 + 9x + 8 = 0$ to three significant figures, by completing square method. (3 marks)

(e) Use the properties of logarithms to solve $\log_2(x^2 - 6x) = 3 + \log_2(1 - x)$ for *x*:   (3marks)

(f) Work out $(^4P_2)\ (5 + 3x)\ \binom{5}{2} = 1140$ (3marks)

(g) a) Write down the first five terms of the expansion of $\left(1 - \dfrac{x}{3}\right)^5$ (2 marks)

    b) Using the first three terms of the expansion. Find the values of $(1.01)^5$ to 4dp.   (2marks)

(h) Find the radius and the co-ordinates of the centre of a circle whose equation is

$$\frac{1}{2}x^2 + \frac{1}{2}y^2 - 3x + 4y + 6\frac{3}{8} = 0$$ (3marks)

(i) Find the differential coefficient using the method indicated in the bracket (6 marks)

(i) $y = \frac{2}{5}x^3 - \frac{4}{x^3} + \sqrt[4]{x^5} + 7$ (Power rule)

(ii) $y = \frac{2}{(2t-5)^4}$ (Chain rule)

QUESTIONS TWO: 20 MARKS

(a) Work out (6 marks)

(i) $\sum_{i=1}^{35}(-45 + 5i)$

(ii) $\sum_{n=0}^{20} 4(0.6)^n$

(b) Evaluate $\frac{\sqrt{14}}{\sqrt{7}-\sqrt{2}} - \frac{\sqrt{14}}{\sqrt{7}+\sqrt{2}}$ by rationalizing the denominator (3 marks)

(c) Work out $\int \left(\frac{2x^3-3x}{4x}\right)dx$ (3 marks)

(d) Given the polynomial, $P(x) = 2x^3 - 3x^2 - 7x - 6$. Find (3 marks)

(i) P(-2)
(ii) P(1)
(iii) P(-3)

(e) The data below represent masses to the nearest kilogram of fish caught in a day.

Masses	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29
No. of fish	5	20	10	10	5

Determine:
(i) Mean (2 marks)

(ii) Standard deviation (3 marks)

QUESTIONS THREE: 20 MARKS

(a) Divide using long division. State the quotient, q(x), and use remainder theorem to find, r(x).
$$(6x^3 + 17x^2 + 27x + 20) \div (3x + 4)$$
(5 marks)

(b) (i) Find the equation of the tangent and normal to the curve $y = \dfrac{4}{x}$ at x = 1. (5 marks)

(i) Find and classify the turning points of the curve represented by $y = x^3 + 3x^2 - 9x - 4$ (6 marks)

(ii) Hence sketch the curve $y = x^3 + 3x^2 - 9x - 4$ (4 marks)

....