CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATION

RESIT /SPECIAL EXAMINATION

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE

MATH 101:

STREAMS: **TIME:2 HOURS**

DAY/DATE: FRIDAY 05/11/2021 **8.30 A.M – 10.30 A.M**

INSTRUCTIONS:

ANSWER ALL QUESTIONS

QUESTIONS ONE: 30 MARKS

(a) Solve the following equation $\frac{1}{3}(3m-6)+\frac{1}{4}(5m+4)+\frac{1}{5}(2m-9)=-3$ (2 marks)

(b) Find the value of $\dfrac{3^2\times5^5+3^3\times5^3}{3^4\times5^4}$ (3 marks)

(c) Simplify $\dfrac{(3^2)^{\frac{3}{2}}\times\left((8)^{\frac{1}{3}}\right)^2}{(3)^2\times(4^3)^{\frac{1}{2}}\times9^{-\frac{1}{2}}}$ expressing the answer in index form with positive indices (2 marks)

(d) The expression x^3+kx^2-2x-4, is divisible by (x +1)

(i) Find the value of k (1 mark)

(ii) Use the long division method to confirm this result. Hence, solve the equation

$x^3+kx^2-2x-4=0$ (with the value of k in (i) above). (3 marks)

(e) Simplify $\dfrac{\left(x^2y^{\frac{1}{2}}\right)\left(\sqrt{x}\,(\sqrt[3]{y^2})\right)}{(x^5y^3)^{\frac{1}{2}}}$ leaving the answer with positive indices only. (3 marks)

(f) Given that $\frac{3}{2-\sqrt{18}}+\frac{5}{2+\sqrt{18}}=a+b\sqrt{c}$. Find the values of a, b and c. (3 marks)

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

(h) Simplify completely $\frac{2x^2+x-3}{18-8x^2}$ (2 marks)

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

(j) Solve $-x^2=8x+1$ using a quadratic formula (2 marks)

(k) Find the centre and radius of a circle whose equation is $3x^2+3y^2=12x+18y+9$. (3marks)

(l) Determine the 19th term of an AP given that the 6th term is 17 and the 13th term is 38. (2 marks)

QUESTIONS TWO: 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 $y=\frac{4}{x}$ at x = 1. (5 marks)

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

(6 marks)

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

QUESTIONS THREE: 20 MARKS

(m) Work out (6 marks)

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

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

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

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

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

(i) P(-2)

(ii) P(1)

(iii) P(-3)

(q) 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)
