Instructions to Candidates
You should have the following for this examination
-Answer Booklet, examination pass and student ID
This paper consists of 5 questions. Attempt question one compulsory and any other two
questions
Do not write on the question paper.

Question ONE (30 MARKS)

a) Determine the value of

$$\frac{7}{6} \, of \left(3 \tfrac{1}{2} - 2 \tfrac{1}{4} \right) + 5 \tfrac{1}{8} \div \tfrac{3}{16} - \frac{1}{2}$$

(4 mks)

b) A block of alloy consists of 70% nickel and 30% copper. if it contains 88.2g of nickel,
determine the total mass of dyes used. (2 mks)

c) When mixing a quantity of paints, dye of four different colors are used in the ratio of
7:3 :19 : 5.if the mass of the 1st dye used is 3½g. Determine the total mass of the dyes
used. (2mks)

d) Convert the following binary number into decimal numbers

(i). 10111.011_2 (3mks)

(ii) 11010101.10111_2 (3mks)

e) Add the following binary numbers 110011_2 + 11101_2

Convert your answer to decimal number   (5 mks)

f) Convert decimal numbers into binary number

i.   31.28125   (4 mks)

ii.   45.21875   (4 mks)

g) Solve for x
$$\frac{x}{4} - \frac{x+6}{5} = \frac{x+3}{2}$$
                                                     (3 mks)

Question TWO (20 MARKS)

a) Evaluate

i.
$$\frac{4^{1.5} \times \left(8^{\frac{1}{3}}\right)^2}{2^2 \times 32^{-\frac{2}{5}}}$$
                                (3mks)

ii.
$$\frac{8^{-2} \times 5^2 \times 3^{-4}}{25^2 \times 2^4 \times 9^{-2}}$$
                                (3mks)

b) Solve the equation

i. $\log_4 x = -2\frac{1}{4}$ (2mks)

ii. $2^x = 5.5$ (2mks)

c) Solve following indical equations for x each giving your answer correct to 4 significant figures.

    i. $5^{x-1} = 3^{2x-1}$ (3mks)

    ii. $X^{-0.25} = 0.792$ (2mks)

    iii. $X^{1.5} = 14.91$ (2mks)

    iv. $3^{2t-1} = 7^{t+1}$ (3mks)

Question THREE (20 MARKS)

a) Solve the following equations

    i. $\dfrac{3}{t-2} = \dfrac{4}{3t+4}$ (2mks)

    ii. $\dfrac{1}{3}(3m-6) - \dfrac{1}{4}(5m+4) + \dfrac{1}{5}(2m-9) = -3$ (3mks)

    iii. $\dfrac{x+3}{4} = \dfrac{x-3}{5} + 2$ (3mks)

b) Solve the following simultaneous equations

    i.   By elimination

$$\frac{x}{2} + \frac{y}{3} = 4$$

                                                  (3 mks)

$$\frac{x}{6} - \frac{y}{9} = 0$$

    ii.   By substitution

$$\frac{a}{2} - 7 = -2b$$

$$12 = 5a + \frac{2}{3}b$$

                                                  (3 mks)

c) Solve following quadratic equation

    i.   By factorization

        $15x^2 + 2x - 8 = 0$ (3mks)

ii. By use of quadratic formulae
$2x^2 - 7x = 4 = 0$ (3 mks)

Question FOUR (20 MARKS)

a) Find the sum of all the numbers between 0 and 207 which are exactly divisible by 3

(4 marks)

b) Which term of the series 2187, 729, 243... Is $\dfrac{1}{9}$ (4 mks)

c) Evaluate

i. $^9C_6$ (2mks)

ii. $^8C_5$ (2mks)

d) Evaluate

i. $^8P_5$ (2mks)

ii. $^{10}P_3$ (2mks)

e) Expand $(2a + 3b)^5$ using Pascal's triangle (4 mks)

Question FIVE (20 MARKS)

a) Solve the given simultaneous equation graphically

$$x + y = 2$$
$$3y - 2x = 1$$

(8 mks)

b) Solve the quadratic equation $y = 4x^2 + 4x - 15 = 0$ graphically given that the solution lies in the range x = -3 to x = 2

Determine also the coordinates and nature of turning point of the curve. (9 mks)

c) Without plotting graph give the gradient and y axis intercept of the given functions.(3mks)

$$y = 5 - 4x$$
$$y - 6x = 3$$
$$3y - 2x = 1$$