THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA
FORM TWO NATIONAL ASSESSMENT

042 **ADDITIONAL MATHEMATICS**

Time: 2:30 Hours **SOLUTIONS** **Year: 2015**

Instructions

1. This paper consists of two sections **A** and **B** with total of twenty five **(25)** **Compulsory** questions**..**
2. Answer **all** questions.
3. All writing must be in **blue** or **black** ink **except** drawing which must be in pencil.
4. Cellular phones and any unathorized materials are **not** allowed in the assessmenmt room.
5. Write your **Assessment Number** at the top right hand corner of every page.

SECTION A (60 MARKS)

Answer all questions

1. Write the next three numbers in the pattern: 4, 8, 12, 20, ...

   Differences are 4, 4, 8. Next differences 8, 16, 16.

   20 + 8 = 28
   28 + 16 = 44
   44 + 16 = 60

   Next three number are 28, 44 and 60.

2. Make x the subject of the formula: $y = (y-b)/(x-a)$

   $y(x - a) = y - b$
   $yx - ya = y - b$
   $yx = y - b + ya$

   $x = (y - b + ya)/y$

3. If the interior angles of a qudrilaterals are $2x$, $2x-1$, $3x-10$ and $x-13$, find the value of x.

   Sum = 360

   $2x + 2x - 1 + 3x - 10 + x - 13 = 360$

   $8x - 24 = 360$

   $8x = 384$

   $x = 48$

4. Use divisibility rule to show whether 47187 is divisible by 9 or not.

$4 + 7 + 1 + 8 + 7 = 27$
27 divisible by 9
So 47187 divisible by 9

5. Write each of the following expressions in simplest form

   a) $7m - 2n + 6 - 5m + 7n + 3$

   $7m - 5m = 2m$
   $-2n + 7n = 5n$
   $6 + 3 = 9$
   Answer = **2m + 5n + 9**

   b) $\frac{72a^2 b}{8a} = 8ab$

   $9ab - 8ab = ab$

6. Find x : y given that $(x + y):(2x + y) = 4:5$.

   $(x + y)/(2x + y) = 4/5$
   $5x + 5y = 8x + 4y$
   $y = 3x$
   x : y = 1 : 3

7. (a) The table below shows the connectives used in logic. Write the symbol used for each connective:

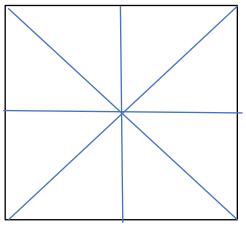
Connective	Symbol
Equivalence	↔

Disjunction	∨
Condition	→
Conjunction	∧

(b) Write the following statement in symbolic form: "If 2 is an even number, then 5 is an odd number."

Symbol: p → q

8. (i) Draw all lines of symmetry in the following figure:



(ii) State the number of lines of symmetry

Four lines

9. Find the value of t in the equation: 1/2t + 2/5 = t - 4/5.
   Multiply by 10
   5t + 4 = 10t - 8
   12 = 5t
   t = 12/5

10. The period T of a simple pendulum varies directly with the square root of length l of the pendulum and when the period is1.2sthe length is 0.36m.

    $T = k\sqrt{l}$

    $1.2 = k\sqrt{0.36}$

    $0.36 = 0.6$

    $k = 1.2 \div 0.6 = 2$

    $T = 2\sqrt{l}$

11. Find the equation of locus of the points which are equidistant from the points A(1,1) and B(5,3).

    $(x - 1)^2 + (y - 1)^2 = (x - 5)^2 + (y - 3)^2$

    Expand and simplify

    $2x + y = 8$

12. Find the coordinates of the midpoint of the line segment which joins the points P(3,7) and R(5,9).

    $x = (3 + 5)/2 = 4$

    $y = (7 + 9)/2 = 8$

    Midpoint = (4,8)

13. (a) Define the term „Non-Collinear points".

    Non collinear points do not lie on the same straight line

    (b) Find k if the points R(3,4), S(k ,1)and T(15,−5) are collinear.

Slope RT = (-5 - 4)/(15 - 3) = -9/12 = -3/4
-3/(k - 3) = -3/4
4 = k - 3
k = 7

14. Find the number of sides of the polygon whose sum of interior angles is 540^0.

(n - 2)180 = 540
n - 2 = 3
n = 5

15. Find the points of intersection of the curve $y = x^2$ and the line $y = 2x + 3$.

$x^2 = 2x + 3$
$x^2 - 2x - 3 = 0$
(x - 3)(x + 1) = 0
x = 3, x = -1
Points (3,9) and (-1,1)

16. (a) Define the term "Contradiction" as it is used in logic.

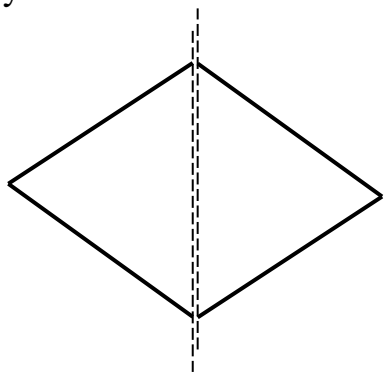
Contradiction is a statement always false

(b) Write the contrapositive of the proposition (p ∨ q) →~ q.

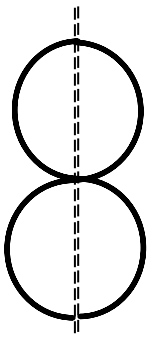
q → ~(p ∨ q)

17. Complete the shapes of the provided figures which contained lines of symmetry indicated by dotted lines.

a)



(b)



18. Find the stationary point on the quadratic function $y = x^2 + 10x + 10$.

    $dy/dx = 2x + 10 = 0$
    $x = -5$
    $y = 25 - 50 + 10 = -15$
    Stationary point = (-5, -15)

19. If $ab = a(b^2) - 2b(ab)$.

    First find $2\mathit{3}$
    $\mathit{23} = 2(3^2) = 18$
    Now $(2*3)\mathit{5}$
    $\mathit{185} = 18(5^2) = 18(25) = 450$

20. The average score of a student in four subjects was 80 marks. Find an average score of five subjects if the score in the fifth subject was 95 marks.

    Chicken 37, Fish 48, Beef 45
    C∩F = 15, F∩B = 13, C∩B = 7, All = 5

    b) Beef only = 45 - 13 - 7 + 5 = 30

    c) Total = 37 + 48 + 45 - 15 - 13 - 7 + 5 = 100

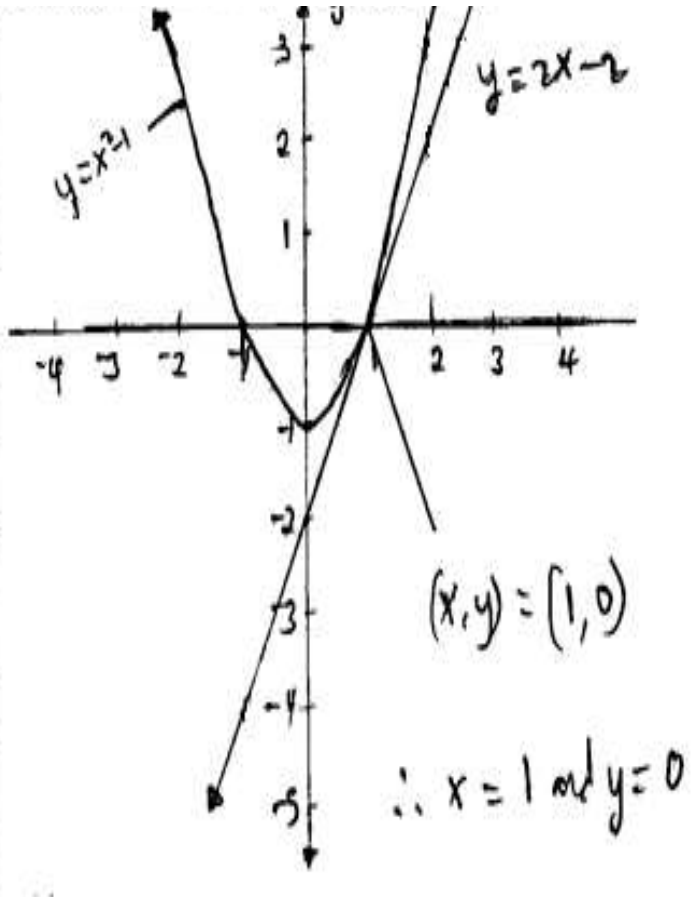
SECTION B(40 Marks)

Answer all questions

21. Use graphical method to solve the following simultaneous equations:

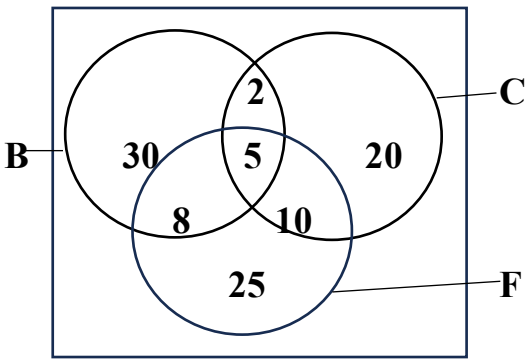
$$\begin{cases} y = 2x - 2 \\ y = x^2 - 1 \end{cases}$$

x	-2	-1	0	1	2	3
$y=2x-2$	-6	-4	-2	0	2	4
$y=x^2-1$	3	0	-1	0	3	8



22. In a group of tourists, 37 like chicken, 48 like fish and 45 like beef, 15 like chicken and fish, 13 like fish and beef, 7 like chicken and beef and 5 like all the three"

a) Draw a Venn diagram to represent the given information,



b) Find the number of tourists who like Beef only

Chicken 37, Fish 48, Beef 45

$C \cap F = 15$, $F \cap B = 13$, $C \cap B = 7$, All = 5

c) Calculate the number of tourists in the group if each tourist has at least one choice.

Total = 37 + 48 + 45 - 15 - 13 - 7 + 5 = 100

23. (a) Write the converse of the statement "If x is a negative number then x^2 is positive.

(b) Show that the proposition $(\sim P \wedge Q) \wedge (Q \rightarrow P)$ is a contradiction by using a truth table.

(a) Converse: If x^2 is positive then x is negative.

(b) Truth table always false.

(c) Circuit uses switches P, R in series and a branch for P or S

24. (a) The line y = 2x + 4 which is parallel to another line which passes through the points (k,4) and (4,6), find the value of k.

(6 - 4)/(4 - k) = 2

2/(4 - k) = 2

4 - k = 1

k = 3

(b) Find the equation of a line which is perpendicular to the line $y = \frac{3}{4}x - 4$ and passes through the point (1, 4).

Perpendicular slope to 3/4 is -4/3

y - 4 = -4/3(x – 1)

25. Given thta y is directly proportional to the square of x and inversely proportional to z. If y =12 , when x =10 and z = 50; find y when z=50 and z=30 .

$y \propto x^2/z$

$y = kx^2/z$

$12 = k(100)/50$

$12 = 2k$

$k = 6$

When z = 50, y = 12

When z = 30, y = 600/30 = 20