ONE TWO ACADEMY UNIT TEST - 3

HSC 1ST YEAR **MATHEMATICS** **TOTAL:- 50**

Relations and Functions

SECTION A

Note:-

- Solution for One words is must.

Choose the correct answer:- **10 x 1 = 10**

1)The function f : [0,2π] -> [-1,1] defined by f(x) = sin x is

(1) one - one (2) onto (3) bijection (4) cannot be defined.

2)The range of the function $\frac{1}{1-2sinx}$ is

(1) (-∞, -1) U ($\frac{1}{3}$,∞) (2) (-1,$\frac{1}{3}$) (3) [-1,$\frac{1}{3}$] (4) $(-\infty, -1) \ U \ [\frac{1}{3}, \infty]$.

3) The function f : R -> R defined by f(x) = sinx + cosx is

(1) odd function (2) even function (3) neither odd nor even function (4) both (1) and (2)

4)If A = {(x,y) : y = sinx, x ∈ R} and B = {(x,y) : y = cosx, x ∈ R} then A ∩ B contains

(1) no element (2) infinitely many elements (3) Only one element (4)cannot be determined.

5)The number of relations on a set containing 3 elements is

(1) 9 (2) 81. (3) 512 (4) 1024

6) If R = {(1,a) , (2,b) , (2,c), (3,a) } then R^{-1} =

(1) {{(a,1) , (b,2) , (c,2), (a,3) } (2) does not exist (3) R = { } (4) $\{(1,a) , (2,b) , (2,c), (3,a) \}^{-1}$

7) Assertion:- |_ 7.23 _| = 7

Reason:- |_ _| is smallest integer function.

(1) A is true and R is false (2) A is false and R is true

(3) A is true and R is true and R is the correct explanation for A (4) Both A and R are false.

8) Which of the following functions in incorrect ?

(1) The inverse of a linear function is also linear.

(2) All bijections are surjections.

(3)The inverse of logarithm function is exponential function.

(4) A function which is not odd is even

9) Assertion:- The product of odd function and even function is odd function.

Reason:- f(-x)g(-x) = -f(x)g(x)

(1) A is true and R is false (2) A is false and R is true

(3) A is true and R is true and R is the correct explanation for A (4) Both A and R are false.

10)If n((AXB) ∩ (AxC)) = 8 and n(B ∩C) = 2 then n(A) is

(1) 6 (2) 4 (3) 8 (4) 16

SECTION B

Answer any 5 of the following (Question no 11 is compulsory):- **5 x 2 = 10**

11) " Is it correct to say A X A = { (a,a) : a ∈ A } ?

12) In the set of Z of integers, define mRn if m - n is a multiple of 12. Prove that R is an equivalence relation.

13) Write notes on modulus functions.

14) Find the domain of $\frac{1}{1-2sinx}$.

15) If f : R -> R is defined by f(x) = 2x -3 prove that f is bijection and find its inverse.

16) From the curve y = x, draw y = -x.

17) Let f and g be the two functions from R to R defined by f(x) = 3x - 4 and g(x) = x^2 + 3.Find got and fog.

SECTION C

Answer any 5 of the following (Question no 21 is compulsory):- 5 x 3 = 15

18) Find the largest possible domain of the real valued function $f(x) = \frac{\sqrt{4-x^2}}{\sqrt{x^2-9}}$.

19)The owner of small restaurant can prepare a particular meal at a cost Rs 100. He estimates that if the menu price of the meal is x rupees, then the number of customers who will oder that meal at that price of the meal is x rupees, the number of customers who will order that meal at that price in an evening is given by the function D(x) = 200 - x.Express his day revenue, total cost and profit on this meal as function of x.

20)Find the largest possible domain for the real valued function f defined by f(x) = $\sqrt{x^2-5x+6}$.

21)Check whether the function for bijection:- a) f : N -> N defined f(n) = n^2.

b) f:R->R defined by f(x) = $\frac{1}{x}$.

22)Let P be a set of all triangles in a plane and R be the relations defined on P as aRb is a is similar to b. Prove that R is an equivalence relation.

23)State De Morgans laws of complementation and explain with Venn diagram.

SECTION D

Answer the following:- 3 x 5 = 15

1) Discuss the following relation for reflexivity, symmetrical and transitivity.

" Let A be the set consisting of all the member of the family. The relation R is defined by "aRb if a is not a sister of b".

2)On the set of natural numbers let R be the relation defined by aRb is a + b <= 6. Write down the relation by listing all the pairs. Check whether it is a)Symmetric b) Reflexive c)transitive d)equivalence.

3) If g(x) = x^2 + 2x +1 and g(f(x)) = $4x^2$ - 12x + 9 then find f(x).

4)The distance of an object falling is a function of time t and can be expressed as s(t) = $-16t^2$. Graph the function and determine if its one-one.

5)From the curve y = sinx, draw y = sin|x|.

6)If f,g : R -> R are defined by f(x) = |x| + x and g(x) = |x| - x, find gof and fog.