ONE TWO ACADEMY

Unit Test - 02

TOTAL:- 45 **GENERAL MATHEMATICS** **STD XII**

Complex numbers

Choose the correct answer:- ***5 x 1 = 5***

1)If z is a complex number of unit modulus and argument θ, then arg $\frac{1+z}{1+\bar{z}}$ is equal to

(1) -θ (2) 90^0 - θ (3) θ (4) 180^o - θ

2)If arg(z) < 0, then arg (-z) - arg (z) equals to

(1) π (2) $-\pi$ (3) $-\frac{\pi}{2}$ (4)$\frac{\pi}{2}$

3)If w is an imaginary solution of cube roots of unity and $(1 + w)^7 = A + Bw$

Then A and B respectively are

(1) 0,1 (2)1,1 (3)1,0 (4)-1,-1

4)The value of $i + i^{23} + i^{24} + i^{25} + i^{26}$ is

(1) i (2) -1 (3)0 (4) -i

5)If (m-5) + i(n+4) is the complex conjugate of (2m+3) + i(3n-2) then (n,m) are

(1)$(-8,\frac{-1}{2})$ (2)$(\frac{-1}{2}, 8)$ (3)$(\frac{1}{2}, -8)$ (4)$(\frac{-1}{2}, -8)$

Answer any five of the following (Question no 13 is compulsory):- ***5 x 2 = 10***

6)Show that |3z -5 +i| = 4 represents a circle, find its radius and centre.

7)Obtain the cartesian form of the locus z = x + iy in the following case: |z - 1| = |z + i|.

8)State true or false:-

a)Any complex number z = x + iy can be expressed as z= r (cosθ + i sinθ).

b)The n^{th} roots of unity are in arithmetic progression.

9)Find the polar form of the complex number -2 -i2.

10)Simplify $i\ i^2\ i^3 \ldots\ldots i^{2000}$.

11)If z = 2 + 5i find a)Additive inverse of z.

b)multiplicative inverse of z.

12)Find the value of $\sum_{k=1}^{8} cos\frac{2k\pi}{9} + isin\frac{2k\pi}{9}$.

13)If $z^2 = (0,1)$ find z. [Hint:- Find the square root of z]

Answer any five of the following(Question no 19 is compulsory):- ***5 x 3 = 15***

14)If $w \neq 1$ the cube roots of unity, show that the roots of the equation $(z-1)^3 + 8 = 0$ are -1, 1 -2w, 1 1- $2w^2$.

15)Show that 1, $\frac{-1}{2} + i\frac{\sqrt{3}}{2}$ and $\frac{-1}{2} - i\frac{\sqrt{3}}{2}$ are the vertices of an equilateral triangle.

16)Prove that $\arg(z_1z_2) = \arg(z_1) - \arg(z_2)$.

17)If cosA + cosB + cosC = sinA + sinB + sinC = 0, show that cos3A + cos3B +cos3C = 3cos(A+B+C).

18)If $\frac{1+z}{1-z} = cos2A + isin2A$, show that z = i tanA.

19)Find the value of $\left(\frac{1+\sin\frac{\pi}{10}+i\cos\frac{\pi}{10}}{1+\sin\frac{\pi}{10}-i\cos\frac{\pi}{10}}\right)^{10}$.

20)Solve $x^4 - 1 = 0$.

Answer the following:- ***3 x 5 = 15***

21)State and prove the triangle inequality

OR

Find all the cube roots of $\sqrt{3} + i$.

22)Solve the equation $z^3 + 8i = 0$, where $z \in \mathbf{C}$.

OR

State and prove the triangle inequality

23)If z = x+ iy and $\arg\frac{z-1}{z+1} = \frac{\pi}{2}$, show that $x^2 + y^2 = 1$.

OR

Given the complex z = 3 + 2i, represents the complex number z, iz and z +iz in an argand plane. Show that these complex numbers form the vertices of an isosceles triangle.

ALL THE BEST