Sri Raghavendra Tuition Center

COMPLEX NUMBER : 2.1 to 2.6

12th Standard

Maths

Date : 28-Apr-24

Reg.No. :

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APPLICATION NAME: ARCHANGEL

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ONLINE / OFFLINE CLASSES AVAILABLE

Exam Time : 01:30:00 Hrs

Total Marks : 50

I. ANSWER ALL QUESTION
5 x 1 = 5

1) The value of $\sum_{n=1}^{13} \left(i^n + i^{n-1} \right)$ is

   (a) 1+ i   (b) i   (c) 1   (d) 0

2) $i^n + i^{n+1} + i^{n+2} + i^{n+3}$ is

   (a) 0   (b) 1   (c) -1   (d) i

3) If $|z| = 1$, then the value of $\frac{1+z}{1+\bar{z}}$ is

   (a) z   (b) $\bar{z}$ (c) $\frac{1}{z}$ (d) 1

4) The area of the triangle formed by the complex numbers z, iz and z+iz in the Argand's diagram is

   (a) $\frac{1}{2}|z|^2$ (b) $|z|^2$ (c) $\frac{3}{2}|z|^2$ (d) $2|z|^2$

5) If (1+i)(1+2i)(1+3i)...(1+ni) = x + iy, then $2 \cdot 5 \cdot 10... \left(1 + n^2 \right)$ is

   (a) 1   (b) i   (c) $x^2 + y^2$ (d) $1 + n^2$

II. ANSWER ANY 5 QUESTION
7 x 2 = 14

6) Write the following in the rectangular form:

   $\overline{(5 + 9i) + (2 - 4i)}$

7) Simplify the following

   $\sum_{n=1}^{10} i^{n+50}$.

8) Find the square root of 6−8i .

9) Find the modulus of the following complex numbers

   2i(3−4i)(4−3i).

10) Prove the following properties

   $Re\,(z) = \frac{z+\bar{z}}{2}$ and $Im(z) = \frac{z-\bar{z}}{2i}$

11) Obtain the Cartesian form of the locus of z = x + iy in each of the following cases:

   $|z + i| = |z - 1|$

12) Find the value of the complex number $(i^{25})^3$.

III. ANSWER ANY 5 QUESTION
7 x 3 = 21

13) Find z^{-1}, if z = (2 + 3i) (1− i).

14) Simplify $\left(\frac{1+i}{1-i} \right)^3 - \left(\frac{1-i}{1+i} \right)^3$ into rectangular form

15) If z_1= 3 - 2i and z_2 = 6 + 4i, find $\frac{z_1}{z_2}$ in the rectangular form.

16) If $|z| = 2$ show that $3 \leq |z + 3 + 4i| \leq 7$

17) The complex numbers u, v, and w are related by $\frac{1}{u} = \frac{1}{v} + \frac{1}{w}$ If v = 3−4i and w = 4+3i, find u in rectangular form.

18) Which one of the points $10 - 8i$, $11 + 6i$ is closest to $1 + i$.

19) Show that the following equations represent a circle, and, find its centre and radius

$|2z + 2 - 4i| = 2$

IV. ANSWER ALL QUESTION   4 x 5 = 25

20) Find the values of the real numbers x and y, if the complex numbers $(3-i)x-(2-i)y+2i +5$ and $2x+(-1+2i)y+3+ 2i$ are equal.

21) If z_1, z_2, and z_3 are three complex numbers such that $|z_1| = 1$, $|z_2| = 2|z_3| = 3$ and $|z_1 + z_2 + z_3| = 1$, show that $|9z_1z_2 + 4z_1z_2 + z_2z_3| = 6$

22) State and prove triangle inequality?

23) a) Show that $\left(2 + i\sqrt{3}\right)^{10} - \left(2 - i\sqrt{3}\right)^{10}$ is purely imaginary

(OR)

b) Show that $\left(\frac{19+9i}{5-3i}\right)^{15} - \left(\frac{8+i}{1+2i}\right)^{15}$ is purely imaginary.

ALL THE BEST

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