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Sri Raghavendra Tuition Center

unit - 2 Full Test - 3

12th Standard

Maths

Date : 17-May-24

Reg.No. :

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Exam Time : 01:30:00 Hrs

Total Marks : 50

I. ANSWER ALL QUESTION 10 x 1 = 10

1) The conjugate of a complex number is $\frac{1}{i-2}$. Then the complex number is

(a) $\frac{1}{i+2}$ (b) $\frac{-1}{i+2}$ (c) $\frac{-1}{i-2}$ (d) $\frac{1}{i-2}$

2) If z is a non zero complex number, such that $2iz^2 = \bar{z}$ then |z| is

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

3) If $\left|z-\frac{3}{z}\right| = 2$, then the least value |z| is

(a) 1 (b) 2 (c) 3 (d) 5

4) 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

5) If z is a complex number such that $z \in \mathbb{C}\backslash\mathbb{R}$ and $z+\frac{1}{z}\epsilon R$, then |z| is

(a) 0 (b) 1 (c) 2 (d) 3

6) The principal argument of $(\sin 40°+i \cos 40°)^5$ is

(a) −110° (b) −70° (c) 70° (d) 110°

7) If $\omega \neq 1$ is a cubic root of unity and $\begin{vmatrix} 1 & 1 & 1 \\ 1 & -\omega^2-1 & \omega^2 \\ 1 & \omega^2 & \omega^7 \end{vmatrix}$ = 3k, then k is equal to

(a) 1 (b) -1 (c) $\sqrt{3i}$ (d) $-\sqrt{3i}$

8) If $\omega = cis\frac{2\pi}{3}$, then the number of distinct roots of $\begin{vmatrix} z+1 & \omega & \omega^2 \\ \omega & z+\omega^2 & 1 \\ \omega^2 & 1 & z+\omega \end{vmatrix}$=0

(a) 1 (b) 2 (c) 3 (d) 4

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9) The points represented by 3 - 3i, 4 - 2i, 3 - i and 2 - 2i form _____ in the argand plane.

(a) collinear points (b) Vertices of a parallelogram (c) Vertices of a rectangle

(d) Vertices of a square

10) If the cube roots of unity are $1, \omega, \omega^2$ then $1+\omega+\omega^2 =$ ____________

(a) 1 (b) 0 (c) -1 (d) ω

II. ANSWER ALL QUESTION 4 x 2 = 8

11) Write the following in the rectangular form:

$\overline{3i} + \frac{1}{2-i}$.

12) Find the least value of the positive integer n for which $\left(\sqrt{3}+i\right)^n$ purely imaginary

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

|z + i| = |z - 1|

14) Simplify the following:

$\sum_{n=1}^{102} i^n$

III. ANSWER ALL QUESTION 4 x 3 = 12

15) If $z_1 = 3$, $z_2 = -7i$, and $z_3 = 5 + 4i$, show that $z_1(z_2 + z_3) = z_1 z_2 + z_1 z_3$

16) 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.

17) If |z| = 1, show that $2 \leq \left|z^2 - 3\right| \leq 4$

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

IV. ANSWER ANY 4 QUESTION 4 x 5 = 20

19) Let z_1, z_2 and z_3 be complex numbers such that $|z_1|| = |z_2| = |z_3| = r > 0$ and $z_1 + z_2 + z_3 \neq 0$ prove that $\left|\frac{z_1z_2+z_2z_3+z_3z_1}{z_1+z_2+z_3}\right|$ = r

20) If z = x + iy is a complex number such that Im $\left(\frac{2z+1}{iz+1}\right) = 0$ show that the locus of z is $2x^2 + 2y^2 + x - 2y = 0$

21) If $\omega \neq 1$ is a cube root of unity, show that the roots of the equation $(z-1)^3 + 8 = 0$ are $-1, 1-2\omega, 1-2\omega^2$.

22) Find the quotient $\frac{2\left(cos\frac{9\pi}{4}+isin\frac{9\pi}{4}\right)}{4\left(cos\left(\frac{-3\pi}{2}+\right)isin\left(\frac{-3\pi}{2}\right)\right)}$ in rectangular form

23) Find the fourth roots of unity.

24) Simplify: $(1+i)^{18}$

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