Model Question Paper

Complex Numbers - Part I

12th Standard

Maths

Reg.No. : | | | | | | |

I.Answer all the Questions.

II.Use blue pen only.

Time : 00:45:00 Hrs

Total Marks : 80

Section-A

4 x 1 = 4

1) The value of $\left[\frac{-1 + i\sqrt{3}}{2}\right]^{100} + \left[\frac{-1 - i\sqrt{3}}{2}\right]^{100}$ is

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

2) The modules and amplitude of the complex number $\left[e^{3-i\frac{\pi}{4}}\right]^3$ are respctively

(a) $e^9, \frac{\pi}{2}$ (b) $e^9 \frac{-\pi}{2}$ (c) $e^6 \frac{-3\pi}{4}$ (d) $e^9 \frac{-3\pi}{4}$

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

(a) $\left(\frac{-1}{2}, -8\right)$ (b) $\left(\frac{-1}{2}, 8\right)$ (c) $\left(\frac{1}{2}, -8\right)$ (d) $\left(\frac{1}{2}, 8\right)$

4) If $x^2 + y^2 = 1$ then the value of $\frac{1+x+iy}{1+(x-iy)}$ is

(a) $x - iy$ (b) $2x$ (c) $-2iy$ (d) $x + iy$

Section-B

4 x 3 = 12

5) P represents the variable complex number z. Find the locus of P, if $|z - 5i| = |z + 5i|$

6) Express the following in the standard form $a + ib$, $\frac{2(i-3)}{(1+i)^2}$

7) Find the real and imaginary parts of the following complex numbers: $\frac{1}{1+i}$

8) Find the least positive integer n such that $\left(\frac{1+i}{1-i}\right)^n = 1$

Section-C

4 x 6 = 24

9) Express the following in the standard form $a + ib$, $\frac{(1+i)(1-2i)}{1+3i}$

10) Find the real values of x and y for which the following equations are satisfied $(1-i)x + (1+i)y = 1 - 3i$

11) For what values of X and Y, the numbers $-3 + ix^2y$ and $x^2 + y + 4i$ are complex conjugate of each other?

12) Prove that the triangle formed by the points representing the complex numbers $(10+8i), (-2+4i)$and $(-11+31i)$ on the Argand plane is right angled.

Section-D

4 x 10 = 40

13) IfP represents the variable complex number z. Find the locus of P, if Im $\left[\frac{2z+1}{iz+1}\right] = -2$

14) Solve:$x^4 - x^3 + x^2 - x + 1 = 0$

15) Find all the values of $\left(\frac{1}{2} - i\frac{\sqrt{3}}{2}\right)^{\frac{3}{4}}$ and hence prove that the product of the value is 1

16) If $\alpha \quad and \quad \beta$ are the roots of $x^2 - 2x + 2 = 0$ and $cot\theta = y + 1$Show that $\frac{(y+\alpha)^n - (y+\beta)^n}{\alpha - \beta} = \frac{sin\, n\theta}{sin^n\theta}$

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