Model Question Paper

Complex Numbers - Part V

12th Standard

Maths

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

I.Answer all the Questions.

II.Use blue pen only.

Time : 02:00:00 Hrs

Total Marks : 88

Section-A

6 x 1 = 6

1) The conjugate of $i^{13}+i^{14}+i^{15}+i^{16}$

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

2) If $-i+2$ is one root equation $ax^2-bx+c=0$, then the other root is

(a) $-i-2$ (b) $i-2$ (c) $2+i$ (d) $2i+1$

3) The quadratic equation whose roots are $\pm i\sqrt{7}$ is

(a) $x^2+7=0$ (b) $x^2-7=0$ (c) $x^2+x+7=0$ (d) $x^2-x-7=0$

4) The equation having $4-3i\ and\ 4+3i$ and as roots is

(a) $x^2+8x+25=0$ (b) $x^2+8x-25=0$ (c) $x^2-8x+25=0$ (d) $x^2-8x-25=0$

5) If $\frac{1-i}{1+i}$ is a root of $ax^2+bx+1=0$, where a, b are real then (a,b) is

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

6) If $-i+3$ is a root of $x^2-6x+k=0$ then the value of k is

(a) 5 (b) $\sqrt{5}$ (c) $\sqrt{10}$ (d) 10

Section-B

7 x 6 = 42

7) If n is a positive integer , prove that $\left(\frac{1+sin\theta+i\cos\theta}{1+sin\theta-i\cos\theta}\right)^n=cosn\left(\frac{\pi}{2}-\theta\right)+i\sin n\left(\frac{\pi}{2}-\theta\right)$

8) If n is a positive integer, prove that $\left(\sqrt{3}+i\right)^n+\left(\sqrt{3}-i\right)^n=2^{n+1}\ cos\frac{n\pi}{6}$

9) Express the following in the standard form $a+ib$, $\frac{i^4+i^9+i^{16}}{3-2i^8-i^{10}-i^{15}}$

10) Find the real values of x and y for which the following equations are satisfied $\frac{(1+i)x-2i}{3+i}+\frac{(2-3i)y+i}{3-i}=i$

11) Find the real values of x and y for which the following equations are satisfied $\sqrt{x^2+3x+8}+(x+4)i=y(2+i)$

12) Prove that if $\omega^3=1$, then $\frac{1}{1+2\omega}-\frac{1}{1+\omega}+\frac{1}{2+\omega}=0$

13) Find the modulus and argument of the following complex numbers:$1+i\sqrt{3}$

Section-C

4 x 10 = 40

14) Find the values $\left(-\sqrt{3}-i\right)^{\frac{2}{3}}$

15) If P represents the variable complex number z, find the locus of P Im$[\frac{2z+i}{iz-1}]=-1$

16) If $x+\frac{1}{x}=2cos\theta$ and $y+\frac{1}{y}=2cos\phi$ show that $\frac{x^m}{y^n}+\frac{y^n}{x^m}=2isin(m\theta-n\phi)$

17) a) If α and β are the roots of $x^2-2x+4=0$ Prove that $\alpha^n-\beta^n=i2^{n+1}sin\frac{n\pi}{3}$ and deduct $\alpha^9-\beta^9$

(OR)

b) Find all the values $[\frac{1}{2}+i\frac{\sqrt{3}}{2}]^{\frac{3}{4}}$. Hence prove that the product of the four values is 1.

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