MATHS

BOOKS - OMEGA PUBLICATION

COMPLEX NUMBER AND QUADRATIC EQUATIONS

Questions

1. Express i^{-39} in the form of $a + ib$.

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2. Find the value of x and y, if $4x + i(3x - y) = 3 - i6$.

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3. Evaluate $\left[\left(\frac{1}{2} + i\frac{7}{3}\right) + \left(4 + i\frac{1}{3}\right)\right] - \left(\frac{-4}{3} + i\right)$

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4. Express $\dfrac{\left(3+i\sqrt{5}\right)\left(3-i\sqrt{5}\right)}{\left(\sqrt{3}+\sqrt{2}i\right)-\left(\sqrt{3}-\sqrt{2}i\right)}$ in the form of $a+ib$.

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5. Express $\left(-2-\dfrac{1}{3}i\right)^3$ in the form of $a+ib$.

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6. Express the following in the form $a + ib$: $(-1)(2i)\left(-\frac{1}{8}i\right)^3$

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7. Express $(5 - 3i)^3$ in the form $a + ib$.

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8. Find the multiplcative inverse of $\sqrt{5} + i3$.

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9. If z_1, z_2 are two complex numbers, then prove that $\overline{\left(\frac{z_1}{z_2}\right)} = \frac{\bar{z}_1}{\bar{z}_2}$

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10. Find the modulus of $\frac{1+i}{1-i} - \frac{1-i}{1+i}$

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11. Find the modulus and argument of complex number $z = \dfrac{1+i}{1-i}$

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12. Change the complex number $1-i$ in the polar form .

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13. Convert the following in the polar form:

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

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14. Convert the complex numbers given below in the polar form: -3

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15. Change the complex number $\frac{-15}{1+i\sqrt{3}}$ into polar form.

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16. Find the square root of $-15-8i$.

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17. Find the square root fo $1-i$.

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18. Solve $x^2 + 3 = 0$

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19. Solve $\sqrt{5}x^2 + x + \sqrt{5} = 0$

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20. Solve $\sqrt{2}x^2 + x + \sqrt{2} = 0$

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21. Solve the following equation :-

$$x^2 + \frac{x}{\sqrt{2}} + 1 = 0$$

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22. Solve $x^2 + x + 1 = 0$

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Important Questions From Miscellaneous Exercise

1. For any two complex numbers z_1 and z_2, prove that

$$Re(z_1 z_2) = Rez_1 Rez_2 - Imz_1 Imz_2$$

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2. If $x - iy = \sqrt{\frac{a - ib}{c - id}}$ prove that $\left(x^2 + y^2\right)^2 = \frac{a^2 + b^2}{c^2 + d^2}$.

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3. Change the complex number $\frac{1+7i}{(2-i)^2}$ into polar form.

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4. If $z_1 = 2, z_2 = 1+i$ find $\left|\frac{z_1+z_2+1}{z_1-z_2+i}\right|$

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5. Let $z_1 = 2-i, z_2 = -2+i.$ Find $Re\left(\frac{z_1 z_2}{\bar{z}_1}\right)$

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6. Find the real numbers x and v if $(x - iy)(3 + 5i)$ is the conjugate of $-6 - 24i$

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7. If $(x + iy)^3 = u + iv$, then show that $\frac{u}{x} + \frac{v}{y} = 4(x^2 - y^2)$

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8. If α and β are different complex numbers with $|\beta| = 1$, then find $\left|\frac{\beta - \alpha}{1 - \overline{\alpha}\beta}\right|$.

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9. If $\left(\frac{1+i}{1-i}\right)^m = 1$, then find the least positive integral value of m.

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10. Find the number of non-zero integral solutions of the equation $|1-i|^x = 2^x$.

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Multiple Choice Questions Mcqs

1. If $n = 4m + 3$, m integral, then i^n is equal to

A. i

B. $-i$

C. -1

D. 1

Answer: B

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2. Find the least positive integer n for which $\left(\frac{1+i}{1-i}\right)^n = 1$

A. $n = 8$

B. $n = 12$

C. $n = 6$

D. none of these.

Answer: B

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3. Which of the following is not applicable for a complex number?

A. addition

B. subtraction

C. division

D. inequality.

Answer: D

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4. $a + ib > c + id, \quad a, b, c, d \in R$ is meaningful only when

A. $a = 0, d = 0$

B. $a = 0, c = 0$

C. $b = 0, c = 0$

D. $b = 0, d = 0.$

Answer: D

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5. If $z = 1 + i$, then the multiplicative inverse of z^2 is

A. $1 - i$

B. $\frac{i}{2}$

C. $-\frac{i}{2}$

D. $2i$

Answer: C

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6. Complex conjugate of i is

A. i

B. $-i$

C. 0

D. 1

Answer: B

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7. The conjugate of $\frac{1}{2+i}$ is

A. $\frac{2+i}{5}$

B. $\frac{2-i}{5}$

C. $\frac{5}{2-i}$

D. $\frac{5}{2+i}$

Answer: A

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8. $\sum \bar{z} = 0$ if and only if

A. $Re(z) = 0$

B. $Im(z) = 0$

C. $z = 0$

D. none of these.

Answer: C

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9. Convert the complex numbers given below in the polar form: $\sqrt{3}+i$

A. $\frac{1}{\sqrt{2}}\left(\sin\frac{\pi}{6}+i\cos\frac{\pi}{6}\right)$

B. $2\left(\cos\frac{\pi}{6}+i\cos\frac{\pi}{6}\right)$

C. $\frac{1}{2}\left(\sin\frac{\pi}{6}+i\cos\frac{\pi}{6}\right)$

D. $4\left(\cos\frac{\pi}{6}+I\sin\frac{\pi}{6}\right)$

Answer: B

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10. The principal value of the amplitude of $(1+i)$

A. $\frac{\pi}{12}$

B. $\frac{\pi}{4}$

C. π

D. $\frac{3\pi}{4}$

Answer: B

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11. The number $\frac{(1-i)^3}{(1-i)^3}$ is equal to

A. i

B. -1

C. 1

D. -2

Answer: D

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12. The value of sum $\sum_{n=1}^{13}\left(i^n+i^{n+1}\right)$,where $i=\sqrt{-1}$ equals

A. i

B. $i-1$

C. $-i$

D. 0

Answer: B

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13. If $\left(\frac{1-i}{1+i}\right)^{100} = a + ib$, than

A. $a = 2, b = -1$

B. $a = 1, b = 0$

C. $a = 0, b = 1$

D. $a = -1, b = 2.$

Answer: B

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14. The conjugate complex number of $\frac{2-i}{(1-2i)^2}$ is

A. $\frac{2}{25}+\frac{11}{25}i$

B. $\frac{2}{25}-\frac{11}{25}i$

C. $-\frac{2}{25}+\frac{11}{25}i$

D. $-\frac{2}{25}-\frac{11}{25}i$

Answer: D

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15. The polar form of the complex number $\left(i^{25}\right)^3$ is

A. $\cos\frac{\pi}{2}+I\sin\frac{\pi}{2}$

B. $\cos\pi+I\sin\pi$

C. $\cos\pi-I\sin\pi$

D. $\cos\frac{\pi}{2}-I\sin\frac{\pi}{2}$

Answer: D

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16. The amplitude of '0' is

A. 0

B. $\frac{\pi}{2}$

C. $-\frac{\pi}{2}$

D. none of these.

Answer: D

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17. The value of $\frac{\left(i^5+i^6+i^7+i^8+i^9\right)}{1+i}=?$

A. $\frac{1}{2}(1+i)$

B. $\frac{1}{2}(1-i)$

C. 1

D. $\frac{1}{2}$

Answer: A

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18. $\left|(1+i)\left(\frac{2+i}{3+i}\right)\right|=?$

A. $-\frac{1}{2}$

B. $\frac{1}{2}$

C. 1

D. -1

Answer: C

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19. Root of the equation is $3^{x-1}+3^{1-x}=2$ is

A. 2

B. 1

C. 0

D. -1

Answer: B

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20. The complete set of values of k for which the quadratic equation $x^2 - kx + k + 2 = 0$ has equal roots is given by

A. $2+\sqrt{12}$

B. $2\pm\sqrt{12}$

C. $2-\sqrt{12}$

D. $-2-\sqrt{12}$

Answer: B

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21. if α, β are irrational roots of $ax^2+bx+c=0$ & (a,b,c $\in Q$),then

A. $\alpha = \beta$

B. $\alpha\beta = 1$

C. α and β are conjugate pairs

D. $\alpha^2 + \beta^2 = 1$

Answer: C

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22. If α, β are the roots of the equation $x^2 - 2x + 2 = 0$, then the value of $\alpha^2 + \beta^2$ is

A. 2

B. 0

C. 1

D. 4

Answer: B

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23. The real quadratic equation whose one root is, $2 - \sqrt{3}$ is

A. $x^2 - 4x + 1 = 0$

B. $x^2 + 2x - 1 = 0$

C. $x^2 - 4x - 1 = 0$

D. none of these.

Answer: A

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24. The number of real solutions of $x^2 - 3|x| + 2 = 0$ is

A. 1

B. 2

C. 3

D. 4

Answer: D

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25. The number of real roots of the equation $2^{2x^2-7x+5} = 1$ are

A. 0

B. 1

C. 2

D. 4

Answer: C

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