MATHS

BOOKS - KUMAR PRAKASHAN KENDRA MATHS (GUJRATI ENGLISH)

COMPLEX NUMBERS AND QUADRATIC EQUATIONS

Practice Work

1. Express each of the following complex number in the form a+ib:

$(5-i)\left(\frac{1}{8}i\right)$

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2. Express each of the following complex number in the form a+ib:

$(-i)(2i)\left(-\frac{1}{3}i\right)^3$

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3. Express each of the following complex number in the form a+ib:

$(1+i)(1+2i)$

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4. Express each of the following complex number in the form a+ib:

$4 - \sqrt{-5}$

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5. Express each of the following complex number in the form a+ib:

i^{998}

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6. Express each of the following complex number in the form a+ib:

$$i^{37} \times \frac{1}{i^{67}}$$

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7. Express each of the following complex number in the form a+ib:

$$i^{29} + \left(\frac{1}{i}\right)^{50}$$

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8. Prove that $i^{107} + i^{112} + i^{117} + i^{122} = 0$

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9. Find the multiplicative inverse of the following complex number.

$3 - 2i$

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10. Find the multiplicative inverse of the following complex number.

$-1+i\sqrt{3}$

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11. Find the multiplicative inverse of the following complex number.

$$\frac{4+3i}{5-3i}$$

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12. Find the multiplicative inverse of the following complex number.

$(2-3i)^2$

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13. Find the multiplicative inverse of the following complex number.

$1 - i$

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14. Express the following expression in the form of a+ib:

$$\left(\frac{4i - 1}{2i + 1}\right)^2$$

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15. Express the following expression in the form of a+lb:

$$\left[\left(\frac{\sqrt{5}+i}{2}\right)(\sqrt{5}-2i)\right]+(6+5i)$$

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16. Express the following expression in the form of a+lb:

$$\frac{5+\sqrt{2}i}{1-\sqrt{2}i}$$

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17. Express the following expression in the form of a+lb:

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

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18. $\frac{(1-i)^3}{1-e^3}$

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19. Express $\frac{1}{1-\cos\theta+2i\sin\theta}$ in the form of $a+ib$.

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20. Express the following in the form of a+ib:

$$\frac{2-\sqrt{-25}}{1-\sqrt{-16}}$$

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21. Express the following in the form of a+ib:

$$\frac{3-\sqrt{-16}}{1-\sqrt{-9}}$$

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22. Find the modulus and the arguments of the following complex numbers :

$1 + i\sqrt{3}$

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23. Find the modulus and the arguments of the following complex numbers :

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

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24. Find the modulus and arguments of the complex numbers.

(i) $\frac{1+i}{1-i}$, (ii) $\frac{1}{1+i}$

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25. Find the modulus and the arguments of the following complex numbers :

$\left(\frac{2+i}{3-}\right)^2$

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26. Find the modulus and the arguments of the following complex numbers :

$\sin 120^\circ - i\cos 120^\circ$

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27. Convert the following complex number in the polar form :

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

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28. Convert the following complex number in the polar form :

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

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29. Convert the complex number $\frac{-16}{1+i\sqrt{3}}$ into polar form.

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30. Convert the complex number $z = \dfrac{1-i}{\frac{\cos\pi}{3} + I\frac{\sin\pi}{3}}$ in the polar form.

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31. Convert the following complex number in the polar form :

$$\frac{2+6\sqrt{3}i}{5+\sqrt{3}i}$$

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32. Convert the following complex number in the polar form :

$$\frac{(1+i)^{13}}{(1-i)^{7}}$$

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33. Convert the following complex number in the polar form :

$2-2i$

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34. Solve the following equations :

$9x^2 + 4 = 0$

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35. Solve the following equations :

$4x^2 - 12x + 25 = 0$

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36. Solve the following equations :

$4x^2 + 1 = 0$

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37. Solve the following equations :

$x^2 + 2x + 2 = 0$

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38. Solve the following equations :

$21x^2 + 9x + 1 = 0$

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39. Solve the following equations :

$x^2 + x + 1 = 0$

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40. Solve the following equations :

$27x^2 - 10x + 1 = 0$

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41. Solve the following equations :

$21x^2 - 28x + 10 = 0$

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42. Solve the following equations :

$13x^2 + 7x + 1 = 0$

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

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44. Solve the following equations:

$x^2 - 5ix - 6 = 0$

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45. Solve the following equations:

$x^2 + 4ix - 4 = 0$

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46. Solve the following equations:

$x^2 - \sqrt{2}ix + 12 = 0$

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47. Solve the following equations:

$3x^2 + 7ix + 6 = 0$

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48. Solve the following equations:

$x^2 - \left(3\sqrt{2} + 2i\right)x + 6\sqrt{2}i = 0$

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49. Find the square roots of the following :

$5 + 12i$

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50. Find the square roots of the following :

$8 - 15i$

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51. Find the square roots of the following :

$1 + 4\sqrt{-3}$

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52. Find the square roots of the following :

$-8-6i$

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53. Find the square roots of the following :

$7-24i$

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54. Find the square roots of the following :

$4-6\sqrt{5}i$

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55. Find the square roots of the following :

$6\sqrt{2}i - 7$

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56. Find the square roots of the following :

$-11 - 60i$

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57. Find the value of the following :

$$\frac{i^{592}+i^{590}+i^{588}+i^{586}+i^{584}}{i^{582}+i^{580}+i^{578}+i^{574}}$$

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58. If $3i^3-2ai^2+(1-a)i+5$ is real then find the value of a.

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59. If

$$\left(x^4+2x.\,i\right)-\left(3x^2-iy\right)=(3-5i)+(1+2iy)$$

then find the real value of x and y.

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60. If $x = -2 - \sqrt{3}i$ then find the value of $2x^4 + 5x^3 + 7x^2 - x + 41$

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61. If $z \in z$ and $|z + 3| \leq 8$ then find the maximum and minimum value of $|z - 2|$.

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62. If $\frac{z-1}{z+1}(z \neq -1)$ is purely imaginary then show that $|z| = 1$

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63. Show that a complex number $-3+2i$ is nearer from origin to the point $1+4i$

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64. Show the complex numbers $-2+3i, -2i$ and 4-I in the Argand plane. Prove that they are vertices ofa right angle triangle.

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65. Find a complex number whose modulus is 4 and principal argument is $\frac{5\pi}{6}$.

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66. If $\frac{(1+i)^2}{2-i} = x + iy$ then find the value of x+y.

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67. show that the set of all point satisfying $|z-1|=|z-i|$ represents a line passing through origin with slope -1.

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68. If $z=3-2i$ then show that $z^2-6z+13=0$

Hence find the value of $z^4-4z^3+6z^2-4z+17$

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69. Find the value of z satisfying the euqation $|z| - z = 1 + 2i$.

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70. Solve $z^2 = z$

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71. If $iz^3 + z^2 - z + i = 0$ then show that $|z| = 1$.

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Exercise 5 1

1. Express each of the complex number given in the form of $a + ib$

$(5i)\left(-\frac{3}{5}i\right)$

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2. Express each of the complex number given in the form of $a + ib$

$i^9 + i^{19}$

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3. Express each of the complex number given in the exercise.

i^{-39}

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4. Express each of the complex number given in the form of $a + ib$

3(7 + i7)+ i(7 + i7)

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5. Express each of the complex number given in the form of $a + ib$

(1-i) - (-1+i6)

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6. Express each of the complex number given in the form of $a + ib$

$$\left(\frac{1}{5} + i\frac{2}{5} - \left(4 + i\frac{5}{2}\right)\right)$$

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7. Express each of the complex number given in the form of $a + ib$

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

Watch Video Solution

8. Express each of the complex number given in the form of $a + ib$

$$(1 - i)^4$$

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9. Express each of the complex number given in the form of $a + ib$

$$\left(\frac{1}{3} + 3i\right)^3$$

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10. Express each of the complex number given in the form of $a + ib$

$$\left(-2 - \frac{1}{3}i\right)^3$$

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11. Find the multiplicative invers of each of the complex number

4-3i

Watch Video Solution

12. Find the multiplicative invers of each of the complex number

$\sqrt{5} + 3i$

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13. Find the multiplicative invers of each of the complex number

$-i$

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Exercise 5 2

1. Find modulus and argument of the complex numbers

$z = -1 - i\sqrt{3}$

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2. Find modulus and argument of the complex numbers

$z = -\sqrt{3} + i$

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3. Convert each of the complex number in the polar form:

1-i

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4. Convert each of the complex number in the polar form:

$-1+i$

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5. Convert each of the complex number in the polar form:

$-1-i$

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6. Convert each of the complex number in the polar form:

-3

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7. Convert each of the complex numbers given in the polar form.

$\sqrt{3} - i$

Watch Video Solution

8. Convert each of the complex number in the polar form:

i

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Exercise 5 3

1. Solve the following: $x^2 + 3 = 0$

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

Watch Video Solution

3. $x^2 + 3x + 9 = 0$

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4. Solve each of the following :

$x^2 - x + 2 = 0$

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5. $x^2 + 3x + 5 = 0$

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6. Solve each of the following :

$x^2 - x + 2 = 0$

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

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8. $\sqrt{3}x^2 - \sqrt{2}x + 3\sqrt{3} = 0$

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

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

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Exercise 5 4

1. Find the square roots of the following :

$-15-8i$

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2. Find the square roots of the following :

$-8-6i$

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3. Find the square roots of the following :

$1-i$

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4. Find the square roots of the following :

i

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5. Find the square roots of the following :

i

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6. Find the square roots of the following :

$1 + i$

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Miscellaneous Exercise

1. Evaluate $\left[i^{18} + \left(\frac{1}{i}\right)^{25}\right]^3$

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2. For any two complex numbers z_1 and z_2, prove that Re $(z_1 z_2) = Rez_1 Rez_2 - 1mz_1 Imz_2$

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3. Reduce $\left(\frac{1}{1-4i} - \frac{2}{1+i}\right)\left(\frac{3-4i}{5+i}\right)$ to the standard form.

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4. 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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5. Conver the following in the polar form:

(i) $\frac{1+7i}{(2-i)^2}$, (ii) $\frac{1+3i}{1-2i}$

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6. Conver the following in the polar form:

(i) $\frac{1+7i}{(2-i)^2}$, (ii) $\frac{1+3i}{1-2i}$

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7. Solve:

$$3x^2 - 4x + \frac{20}{3} = 0$$

Watch Video Solution

8. $x^2 - 2x + \frac{3}{2} = 0$

Watch Video Solution

9. $27x^2 - 10x + 1 = 0$

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10. $21x^2 - 28x + 10 = 0$

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

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12. If $a + ib = \frac{(x+i)^2}{2x^2+1}$, prove that $a^2 + b^2 = \frac{\left(x^2+1\right)^2}{\left(2x^2+1\right)^2}$

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13. Let $z_1 = 2 - I, z_2 = -2 + i$, Find

(i) $\left(Re \frac{z_1 z_2}{\bar{z}_1} \right)$, (ii) $Im \left(\frac{1}{z_1 \bar{z}_1} \right)$

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14. Find the modulus and argument of the complex number $\frac{1+2i}{1-3i}$

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

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

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

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18. 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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19. Find the numbers of non-zero integral solutions of the equation $|1-i|^x = 2^x$

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20. If $(a+ib)(c+id)(e+\quad \text{if} \quad)(g+ih) = A+iB$, then show that $\left(a^2+b^2\right)\left(c^2+d^2\right)\left(e^2+f^2\right)\left(g^2+h^2\right) = A^2+B^2$

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

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Textbook Based Mcqs

1. Find real θ such that $\frac{3+2i\sin\theta}{1-2i\sin\theta}$ is purely real.

A. π

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

C. $\frac{\pi}{3}$

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

Answer: A

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2. The polar form of $\left((i)^{25}\right)^3$ is....

A. $\cos\left(\frac{\pi}{2}\right) + I\sin\left(\frac{\pi}{2}\right)$

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

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

D. $\cos\left(\frac{\pi}{2}\right) - i\sin\left(\frac{\pi}{2}\right)$

Answer: D

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3. If $(1+i)(1+2i)(1+3i)....(1+ni) = a+ib$ then $2 \times 5 \times 10 \times .... \times \left(1+n^2\right) = ...$

A. $a-ib$

B. a^2+b^2

C. a^2-b^2

D. $a+b$

Answer: C

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4. $(\sqrt{-2})(\sqrt{-3}) = \ldots\ldots$

A. $\sqrt{6}$

B. $-\sqrt{6}$

C. $i\sqrt{6}$

D. None of these

Answer: B

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5. If $z = \frac{1+2i}{1-(1-i)^2}$ then arg (z).....

A. 0

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

C. π

D. None of these

Answer: A

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6. If $z = \frac{1}{(2+3i)^2}$ then |z|=...

A. $\frac{1}{13}$

B. $\frac{1}{5}$

C. $\frac{1}{12}$

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

Answer: A

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7. If $z = \frac{1}{1 - \cos\theta - i\sin\theta}$ then Re(z)=....

A. 0

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

C. $\cot\frac{\theta}{2}$

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

Answer: B

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8. $(1+i)^4+(1-i)^4$ = ...

A. 8

B. 4

C. -8

D. -4

Answer: C

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9. If one complex number is in third quadrent then its conjugate complex number is in ..... quadrent.

A. First

B. Second

C. Third

D. Fourth

Answer: B

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10. In Argand figure complex number $\frac{1+2i}{1-i}$ lies in ..... quadrent.

A. First

B. Second

C. Third

D. Fourth

Answer: B

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11. If $|z-1|^2 = |z|^2 + 1$ then in the grand plane, z lines an.....

A. $x^2 + y^2 = 1$

B. Imaginary axis

C. Real axis

D. $2x + 3 = 0$

Answer: B

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12. If $|z+4| \leq 3$ then the maximum value fo $|z+1|$ is....

A. 6

B. 0

C. 4

D. 10

Answer: A

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13. Inverse of $\frac{3+4i}{4-5i}$

A. $-\frac{8}{25}+\frac{31}{25}i$

B. $\frac{8}{25}+\frac{31}{25}i$

C. $-\frac{8}{25}-\frac{31}{25}i$

D. $\frac{8}{25}+\frac{31}{25}i$

Answer: C

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14. If $\left(\sqrt{8}+i\right)^{50}=3^{49}(a+ib)$ then $a^2+b^2=....$

A. 3

B. 8

C. 9

D. $\sqrt{8}$

Answer: C

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15. If $arg(z) < 0$ then $arg(-z) - arg(z)$=.....

A. π

B. $-\pi$

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

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

Answer: A

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16. If $\left|\frac{z-2}{z-3}\right| = 2$ express a circle, then its radius is .....

A. 1

B. $\frac{1}{3}$

C. $\frac{3}{4}$

D. $\frac{2}{3}$

Answer: D

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17. If the conjugate complex number of $(x+yi)(1-2i)$ is 1+i then .....

A. $x = \frac{3}{5}$

B. $y = \frac{3}{5}$

C. $x + yi = \frac{1+i}{1-2i}$

D. $x - yi = \frac{1-i}{1+2i}$

Answer: A

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18. If $z = \cos\left(\frac{\pi}{3}\right) - i\sin\left(\frac{\pi}{3}\right)$ then $z^2 - z + 1 = ...$

A. $-2i$

B. 2

C. 0

D. -2

Answer: C

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19. n is any integer then

$$arg\left(\frac{\left(\sqrt{3}+i\right)^{4n+1}}{\left(1-\sqrt{3}i\right)^{4n}}\right) = ...$$

A. $\frac{\pi}{3}$

B. $\frac{\pi}{6}$

C. $\frac{2\pi}{3}$

D. $\frac{5\pi}{6}$

Answer: B

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20. If $\frac{2z_1}{3z_2}$ is pure imaginarny then $\left|\frac{z_1 - z_2}{z_1 + z_2}\right| = \ldots\ldots$

A. $\frac{3}{2}$

B. 1

C. $\frac{2}{3}$

D. $\frac{4}{9}$

Answer: B

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21. If $z = 3 + 5i$ and then $z^3 + \bar{z} + 198 = 0\ldots$

A. $-3-5i$

B. $-3+5i$

C. $3+5i$

D. $3-5i$

Answer: C

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22. If $\left|z-\frac{9}{z}\right|=6$ then maximum value of $|z|$ is ....

A. $2\sqrt{3}+i3$

B. $3+3\sqrt{2}$

C. $\sqrt{3}+\sqrt{2}$

D. $3-3\sqrt{2}$

Answer: B

View Text Solution

23. If $z=x+iy$, where x and y are real numbers and $|x|+|y| \leq k|z|$ then k=.....

A. 1

B. 2

C. $\sqrt{2}$

D. $\sqrt{3}$

Answer: C

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24. $arg\left(\frac{1-i\sqrt{3}}{1+i\sqrt{3}}\right) = \ldots\ldots$

A. 60°

B. 120°

C. 210°

D. 240°

Answer: D

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25. If $z = \frac{1+7i}{(2-i)^2}$ then.....

A. $|z| = 2$

B. $|z| = \frac{1}{2}$

C. $arg(z) = \frac{\pi}{4}$

D. $arg(z) = \frac{3\pi}{4}$

Answer: D

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Latest Exam Mcqs

1. If α and β are two distinet roots of the equation $x^2 - x + 1 = 0$ then $\alpha^{101} + \beta^{107} =$ ....

A. -1

B. 0

C. 1

D. 2

Answer: A

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Textbook Illustrations For Practice Work

1. If 4x + i(3x-y) = 3 + i(-6), where x and y are real numbers, then find the values of x and y.

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2. Express the following in the form of a+bi,

(i) $(-5i)\left(\frac{1}{8}i\right)$, (ii) $(-i)(2i)\left(-\frac{1}{8}i\right)^3$

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

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

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5. Find the multiplicative inverse of $2-3i$

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6. Express the following in the form a+ib.

(i) $\frac{5+\sqrt{2}i}{1-\sqrt{2}i}$, (ii) i^{-35}

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7. Reprsent the complex numbner $z=1+i\sqrt{3}$ in the polar form.

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8. Convert the complex number $\frac{-16}{1+i\sqrt{3}}$ into polar form.

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9. Solve $x^2 + 2 = 0$

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

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

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12. Find the conjugate of $\frac{(3-2i)(2+3i)}{(1-2i)(2-i)}$

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13. Find the modulus and arguments of the complex numbers.

(i) $\frac{1+i}{1-i}$, (ii) $\frac{1}{1+i}$

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14. If $z = x + iy$ and $x + iy = \frac{a+ib}{a-ib}$ then $x^2 + y^2 = 1$.

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15. Find real θ such that

$$\frac{3+2i\sin\theta}{1-2i\sin\theta}$$ is purely real.

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16. Convert the complex number $z=\dfrac{1-i}{\frac{\cos\pi}{3}+I\frac{\sin\pi}{3}}$

in the polar form.

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Solutions Of Ncert Exemplar Problems Short Answer Type Questions

1. For a positive integer n , find the value of $(1-i)^n\left(1-\frac{1}{i}\right)^n$

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2. Evaluate $\sum_{n=1}^{13}\left(i^n+i^{n+1}\right)$, where $n \in N$.

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3. If $\left(\frac{1-i}{1-i}\right)^3 - \left(\frac{1-i}{1+i^3}\right) = x + iy$, then (x,y).

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

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5. If $\left(\frac{1-i}{1+i}\right)^{100} = a + ib$ then find (a,b)

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6. If $a = \cos\theta + i\sin\theta$, then find the value of $\frac{1+a}{1-a}$

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7. IF $(1+i)z = (1-i)z$, then show that $z = -\bar{z}$.

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8. If $z = x + iy$, then show that $z\bar{z} + 2(z+\bar{z}) + b = 0$ where $b \in R$, represents a circle.

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9. If the real part of $\frac{\bar{z}+2}{\bar{z}-1}$ is 4 then show that the locus of the point representing z in the complex plane is circle.

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10. Show that the complex number z, satisfying the condition $arg\left(\frac{z-1}{z+1}\right)=\frac{\pi}{4}$ lie son a circle.

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11. Find the value of z satisfying the euqation $|z| - z = 1 + 2i.$

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Solutions Of Ncert Exemplar Problems Long Answer Type Questions

1. If $|z + 1| = z + 2(1 + i)$ then find the value of z.

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2. If $arg(z-1) = arg(z+3i)$, then find $x-1, y$, where $z = x+iy$

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3. Show that $\left|\frac{z-2}{z-3}\right| = 2$ represents a circle. Find the centre of radius.

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4. If $\frac{z-1}{z+1}$ is purely imaginary number $(z \neq -1)$ then find the value of |z|.

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5. z_1 and z_2 are two complex number such that $|z_1| = |z_2|$ and $arg(z_1) + arg(z_2) = \pi$, then show that $z_1 = -\bar{z}_2$

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6. If $|z_1| = 1(z_1 \neq -1)$ and $z_2 = \dfrac{z_1 - 1}{z_1 + 1}$ then show that the real part of z_2 is zero.

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7. If z_1, z_2 and z_3, z_4 are two pairs of conjugate complex numbers, then find $arg\left(\frac{z_1}{z_4}\right) + arg\left(\frac{z_2}{z_3}\right)$

.

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8. If $|z_1| = |z_2| = ... |z_n| = 1$, then show that, $|z_1 + z_2 + z_3 + ... z_n| = \left|\frac{1}{z_1} + \frac{1}{z_2} + \frac{1}{z_3} + ... + \frac{1}{z_n}\right|$

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9. If the complex numbers z_1 and $z_2 arg(z_1) - arg(z_2) = 0$ then showt aht $|z_1 - z_2| = |z_1| - |z_2|$.

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10. Solve the system of equation $Re(z^2) = 0, |z| = 2.$

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11. Find the complex number satsifying the equation

$z + \sqrt{2}|(z+1)| + i = 0$

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12. Convert the complex number $z = \frac{1-i}{\frac{\cos\pi}{3} + I\frac{\sin\pi}{3}}$

in the polar form.

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13. If z and we are two complex numbers such that

$|zw| = 1$ and $arg(z) - arg(w) = \frac{\pi}{2}$ then show

that $\bar{z}w = -i$

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14. Fill in the blanks of the following

For any two complex numbers z_1, z_2 and real numbers $a, b|az_1 - bz_2|^2 + |bz_1 + az_2|^2 = ...$

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15. Fill in the blanks of the following

the value of $\sqrt{-25} \times \sqrt{-9}$ is ...

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16. Fill in the blanks of the following

The number $\frac{(1-i)^2}{1-i^3}$ is equal to....

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17. Fill in the blanks of the following

The sum of the series $i + i^2 + i^3 + i^4 + \ldots.$ upto 1000 terms is ....

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18. Fill in the blanks of the following

Multiplicative inverser of 1+I is .....

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19. Fill in the blanks of the following

If z_1 and z_2 are complex numbers such that $z_1 + z_2$ is a real number, then $z_1 =$

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20. Fill in the blanks of the following

arg(z)+ $arg(\bar{z})$ where $(\bar{z} \neq 0)$ is.....

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21. Fill in the blanks of the following

If $|z+4| \leq 3$, then the greatest and least values of

$|z+1|$ are ... and .....

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22. Fill in the blanks of the following

If $\left|\frac{z-2}{z+2}\right| = \frac{\pi}{6}$ then the locus of z is.....

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23. Fill in the blanks of the following

If $|z| = 4 \quad \text{and} \arg(z) = \frac{5\pi}{6}$, then z=.....

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24. State true of false for the following:

The order relation is defined on the set of compolex

numbers.

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25. State true of false for the following:

Multiplication of a non-zero complex number by -I rotates the point about origin through a right angle in the anti-clockwise direction.

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26. State true of false for the following:

For any complex number, z, the minimum value of

$|z| + |z - 1|$ is 1.

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27. State true of false for the following:

The locus represented by $|z - 1| = |z - i|$. Is a line perpendicular to the join the points (1,0) and (0,1)

Watch Video Solution

28. State true of false for the following:

If z is a complex number such that $z \neq 0$ and Re(z)=0 then $1_m\left(z^2\right) = 0$

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29. State true of false for the following:

the inequality $|z-4|<|z-2|$ represents the region given by $x>3$

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30. State true of false for the following:

Let z_1 and z_2 be two complex number's such that $|z_1+z_2|=|z_1|+|z_2|$ then arg $(z_1-z_2)=0$

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31. State true of false for the following:

2 is not a complex number.

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Solutions Of Ncert Exemplar Problems Match Column Short Questions

1. $z = i + \sqrt{3} = r(\cos\theta + \sin\theta)$

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2. Given that $z = -1 + i\sqrt{3}$

Watch Video Solution

3. Given that $|z+2| = |z-2|$

Watch Video Solution

4. Given that $|z+2i| = |z-2i|$

Watch Video Solution

5. Given that $|z+4i| \geq 3 = |x+iy-4i| > 3$

View Text Solution

6. Given that $|z+4| \leq 3$ then greatest & least values of |z + 1| are

Watch Video Solution

7. Given that, $z = \frac{1+2i}{1-i} = \frac{(1+2i)(1+i)}{(1-i)(1+i)}$

Watch Video Solution

8. Given that $z = 1 - i$

Watch Video Solution

9. What is the conjugate of $\frac{2-i}{(1-2i)^2}$?

Watch Video Solution

10. If $|z_1| = |z_2|$, is the necessary that $z_1 = z_2$

Watch Video Solution

11. If $\frac{(a^2+1)^2}{2a-i} = x + iy$ then what is the value of $x^2 + y^2$?

Watch Video Solution

12. Fill in the blanks of the following

If $|z| = 4$ and $\arg(z) = \frac{5\pi}{6}$, then z=.....

Watch Video Solution

13. Find the value of $\left|(1+i)\frac{(2+i)}{(3+i)}\right|$

Watch Video Solution

14. Find the principal argument of $\left(1+i\sqrt{3}\right)^2$.

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15. Where does z lie, if $\left|\frac{z-5i}{z+5i}\right| = 1$?

Watch Video Solution

Solutions Of Ncert Exemplar Problems Objective Type Questions

1. $\sin x + i\cos 2x$ and $\cos x - i\sin 2x$ are conjugate to each other for

A. $x = n\pi, n \in Z$

B. $x = \left(n + \frac{1}{2}\right)\frac{\pi}{2}, n \in Z$

C. $x = 0$

D. No value of x

Answer: D

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2. The real value of α for which the expression $\frac{1 - \sin\alpha}{1 + 2i\sin\alpha}$ is purely real is

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

B. $(2n+1)\frac{\pi}{2}$

C. $n\pi$

D. None of these

Answer: C

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3. If $z = x + iy$ lies in the third quadrant, then $\frac{\bar{z}}{z}$ also lies in the third quadrant, if

A. $x > y > 0$

B. $x < y < 0$

C. $y < x < 0$

D. $g > x > 0$

Answer: B

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4. The value of $(z+3)(\bar{z}+3)$ is equivalent to

A. $|z+3|^2$

B. $|z-3|$

C. z^2+3

D. None of these

Answer: A

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

A. $x = 2n +$

B. $x = 4n$

C. $x = 2n$

D. $x = 4n + 1$

Answer: B

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6. A real value of x satsifies the equation $\left(\frac{3-4ix}{3+4ix}\right) = \alpha - i\beta(\alpha, \beta \in R)$, if $\alpha^2 + \beta^2$ is equal to

A. 1

B. -1

C. 2

D. -2

Answer: A

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7. Which of the following is correct for any two complex number z_1 and z_2?

A. $|z_1 z_2| = |z_1||z_2|$

B. $arg(z_1 z_2) = arg(z_1) \cdot (z_2)$

C. $|z_1 + z_2| = |z_1| + |z_2|$

D. $|z_1 + z_2| \geq |z_1| + |z_2|$

Answer: A

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8. The point represented by the complex nuber (2-i) is rotated about origin through an angle $\frac{\pi}{2}$ in the clockwise direction, the new position of point is

A. $1 + 2i$

B. $-1 - 2i$

C. $2 + i$

D. $-1 + 2i$

Answer: B

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9. If $x, y \in R$ then x+iy is a non-real complex number, if

A. x=0

B. $y = 0$

C. $x \neq 0$

D. $y \neq 0$

Answer: D

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10. If $a + ib = c + id$, then

A. $a^2 + c^2 = 0$

B. $b^2 + c^2 = 0$

C. $b^2 + d^2 = 0$

D. $a^2 + b^2 = c^2 + d^2$

Answer: D

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11. The complex number z= which satisfied the condition $\left|\frac{i+z}{i-z}\right| = i$ lies on

A. circle $x^2 + y^2 = 1$

B. the X-axis

C. the Y-axis

D. the line $x + y = 1$

Answer: B

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12. If z lies on x-axis number, then

A. $\left|z^2\right| > |z|$

B. $\left|z^2\right| > |z|^2$

C. $\left|z^2\right| < |z|^2$

D. $\left|z^2\right| \geq |z|^2$

Answer: B

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13. $|z_1 + z_2| = |z_1| + |z_2|$ is possible, if

A. $z_2 = \bar{z}_1$

B. $z_2 = \dfrac{1}{z_1}$

C. $arg(z_1) = arg(z_2)$

D. $|z_1| - |z_2|$

Answer: C

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14. The real value of θ for which the expression $\frac{1+I\cos\theta}{1-2i\cos\theta}$ is a real number is

A. $n\pi+\frac{\pi}{4}, n\in Z$

B. $n\pi+(-1)\frac{\pi}{4}, n\in Z$

C. $2n\pi\pm\frac{\pi}{4}, n\in Z$

D. None of these

Answer: C

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15. The value of $arg(x)$, when $x < 0$ is

A. 0

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

C. π

D. None of these

Answer: C

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16. If $f(z) = \dfrac{7 - z}{1 - z^2}$ where $z = 1 + 2i$, the $|f(z)|$ is equal to

A. $\dfrac{|z|}{2}$

B. $|z|$

C. $2|z|$

D. None of these

Answer: A

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Questions Of Module Knowledge Test

1. If $4x + i(3x - y)(3x - y) = 3 + i(-6)$ then find the value of x and y.

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2. $z_1 = 4 + 3i$ and $z_2 = -8 + 5i$ then find $z_1 + z_2$.

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3. $z_1 = 9 + 3i$ and $z_2 = -2 - i$ then find $z_1 - z_2$

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4. $z_1 = 3 + I$ and $z_2 = -2 + 6i$ then find $z_1 z_2$

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5. Find the value of $i^{2017} + i^{2018} + i^{2019} + i^{2020}$.

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6. $z_1 = 9 + 3i$ and $z_2 = -2 - i$ then find $\frac{z_1}{z_2}$

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7. Find the reciprocal of $4 + 3i$

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8. Find the value $\left| \frac{1 + \sqrt{3}i}{1 + i} \right|$

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9. Find the conjugate complex number of $z = \frac{1}{i - 1}$

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10. Express the complex numbers $2-4i, \ -2+3i, 0+5i$ and $-2+0i$ in an Argand plane.

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11. Find the polar form of the complex number $z = -1+\sqrt{3}i$

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12. Find the principla argument of the complex number $z = 1-i$

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13. Find the square root of -25i

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14. Solve the following equation:

$x^2 - x + 1 = 0$

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15. Solve the following equation:

$x^2 + 3 = 0$

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