EXERCISE-I

Integral power of iota, Algebraic operations and Equality of complex numbers

1. If $i=\sqrt{-1}$, then $1+i^2+i^3-i^6+i^8$ is equal to

(A) $2-i$ (B) 1

(C) 3 (D) -1

2. If $i^2=-1$, then the value of $\sum_{n=1}^{200} i^n$

(A) 50 (B) – 50

(C) 0 (D) 100

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

(A) i (B) $i-1$

(C) $-i$ (D) 0

4. The least positive integer n which will reduce $\left(\frac{i-1}{i+1}\right)^n$ to a real number, is

(A) 2 (B) 3

(C) 4 (D) 5

5. The value of $i^{1+3+5+...+(2n+1)}$ is

(A) *i* if *n* is even, – *i* if *n* is odd

(B) 1 if *n* is even, – 1 if *n* is odd

(C) 1 if *n* is odd, – 1 if *n* is even

(D) *i* if *n* is even, – 1 if *n* is odd

6. $\left(\frac{1}{1-2i}+\frac{3}{1+i}\right)\left(\frac{3+4i}{2-4i}\right)=$

(A) $\frac{1}{2}+\frac{9}{2}i$ (B) $\frac{1}{2}-\frac{9}{2}i$

(C) $\frac{1}{4}-\frac{9}{4}i$ (D) $\frac{1}{4}+\frac{9}{4}i$

7. Additive inverse of $1-i$ is

(A) $0+0i$ (B) $-1-i$

(C) $-1+i$ (D) None of these

8. $\text{Re}\frac{(1+i)^2}{3-i}=$

(A) $-1/5$ (B) 1/5

(C) 1/10 (D) –1/10

9. If $(1-i)x+(1+i)y=1-3i$, then $(x,y)=$

(A) $(2,-1)$ (B) $(-2,1)$

(C) $(-2,-1)$ (D) (2, 1)

10. $\frac{3+2i\sin\theta}{1-2i\sin\theta}$ will be real, if $\theta=$

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

(C) $n\pi$ (D) None of these

[Where n is an integer]

11. If $z\neq 0$ is a complex number, then

(A) $\text{Re}(z)=0\Rightarrow \text{Im}(z^2)=0$

(B) $\text{Re}(z^2)=0\Rightarrow \text{Im}(z^2)=0$

(C) $\text{Re}(z)=0\Rightarrow \text{Re}(z^2)=0$

(D) None of these

12. If $\frac{5(-8+6i)}{(1+i)^2}=a+ib$, then (a,b) equals

(A) (15, 20) (B) (20, 15)

(C) $(-15,20)$ (D) None of these

13. The true statement is

(A) $1-i<1+i$ (B) $2i+1>-2i+1$

(C) $2i>1$ (D) None of these

14. $\frac{1-2i}{2+i}+\frac{4-i}{3+2i}=$

(A) $\frac{24}{13}+\frac{10}{13}i$ (B) $\frac{24}{13}-\frac{10}{13}i$

(C) $\frac{10}{13}+\frac{24}{13}i$ (D) $\frac{10}{13}-\frac{24}{13}i$

15. $a+ib>c+id$ can be explained only when

(A) $b=0, c=0$ (B) $b=0, d=0$

(C) $a=0, c=0$ (D) $a=0, d=0$

16. If $x, y \in R$ and $(x+iy)(3+2i) = 1+i$, then (x, y) is

(A) $\left(1, \frac{1}{5}\right)$ (B) $\left(\frac{1}{13}, \frac{1}{13}\right)$

(C) $\left(\frac{5}{13}, \frac{1}{13}\right)$ (D) $\left(\frac{1}{5}, \frac{1}{5}\right)$

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

(A) $a = 2, b = -1$ (B) $a = 1, b = 0$

(C) $a = 0, b = 1$ (D) $a = -1, b = 2$

18. If $z_1 = (4, 5)$ and $z_2 = (-3, 2)$ then $\frac{z_1}{z_2}$ equals

(A) $\left(\frac{-23}{12}, \frac{-2}{13}\right)$ (B) $\left(\frac{2}{13}, \frac{-23}{13}\right)$

(C) $\left(\frac{-2}{13}, \frac{-23}{13}\right)$ (D) $\left(\frac{-2}{13}, \frac{23}{13}\right)$

19. If $z = 1+i$, then the multiplicative inverse of z^2 is (where $i = \sqrt{-1}$)

(A) $2i$ (B) $1 - i$

(C) $-i/2$ (D) $i/2$

20. If $\begin{vmatrix} 6i & -3i & 1 \\ 4 & 3i & -1 \\ 20 & 3 & i \end{vmatrix} = x + iy$, then (x, y) is

(A) (3, 1) (B) (1, 3)

(C) (0, 3) (D) (0, 0)

Conjugate, Modulus and Argument of complex numbers

21. If $\frac{z-i}{z+i} (z \neq -i)$ is a purely imaginary number, then $z.\bar{z}$ is equal to

(A) 0 (B) 1

(C) 2 (D) None of these

22. If $\frac{c+i}{c-i} = a+ib$, where a, b, c are real, then $a^2 + b^2 =$

(A) 1 (B) -1

(C) c^2 (D) $-c^2$

23. If the conjugate of $(x+iy)(1-2i)$ be $1+i$, then

(A) $x = \frac{1}{5}$ (B) $y = \frac{3}{5}$

(C) $x + iy = \frac{1-i}{1-2i}$ (D) $x - iy = \frac{1-i}{1+2i}$

24. The conjugate of $\frac{(2+i)^2}{3+i}$, in the form of $a + ib$, is

(A) $\frac{13}{2} + i\left(\frac{15}{2}\right)$ (B) $\frac{13}{10} + i\left(\frac{-15}{2}\right)$

(C) $\frac{13}{10} + i\left(\frac{-9}{10}\right)$ (D) $\frac{13}{10} + i\left(\frac{9}{10}\right)$

25. If $z = 3 + 5i$, then $z^3 + \bar{z} + 198 =$

(A) $-3 - 5i$ (B) $-3 + 5i$

(C) $3 + 5i$ (D) $3 - 5i$

26. If z_1 and z_2 be complex numbers such that $z_1 \neq z_2$ and $|z_1| = |z_2|$. If z_1 has positive real part and z_2 has negative imaginary part, then $\frac{(z_1+z_2)}{(z_1-z_2)}$ may be

(A) Purely imaginary

(B) Real and positive

(C) Real and negative

(D) None of these

27. The moduli of two complex numbers are less than unity, then the modulus of the sum of these complex numbers

(A) Less than unity

(B) Greater than unity

(C) Equal to unity

(D) Any

28. The product of two complex numbers each of unit modulus is also a complex number, of

(A) Unit modulus

(B) Less than unit modulus

(C) Greater than unit modulus

(D) None of these

29. Let z be a complex number, then the equation $z^4 + z + 2 = 0$ cannot have a root, such that

(A) $|z| < 1$ (B) $|z| = 1$

(C) $|z| > 1$ (D) None of these

30. If $|z_1| = |z_2| = ... = |z_n| = 1$, then the value of $|z_1 + z_2 + z_3 + ... + z_n| =$

(A) 1

(B) $|z_1| + |z_2| + ... + |z_n|$

(C) $\left|\frac{1}{z_1} + \frac{1}{z_2} + ... + \frac{1}{z_n}\right|$

(D) None of these

31. If $|z| = 1, (z \neq -1)$ and $z = x + iy$, then $\left(\frac{z-1}{z+1}\right)$ is

(A) Purely real (B) Purely imaginary

(C) Zero (D) Undefined

32. The minimum value of $|2z-1| + |3z-2|$ is

(A) 0 (B) $1/2$

(C) $1/3$ (D) 2/3

33. If $|z| = 1$ and $\omega = \frac{z-1}{z+1}$ (where $z \neq -1$), then $\text{Re}(\omega)$ is

(A) 0 (B) $-\frac{1}{|z+1|^2}$

(C) $\left|\frac{z}{z+1}\right| . \frac{1}{|z+1|^2}$ (D) $\frac{\sqrt{2}}{|z+1|^2}$

34. A real value of x will satisfy the equation $\left(\frac{3-4ix}{3+4ix}\right) = \alpha - i\beta \, (\alpha, \beta \text{ real})$, if

(A) $\alpha^2 - \beta^2 = -1$ (B) $\alpha^2 - \beta^2 = 1$

(C) $\alpha^2 + \beta^2 = 1$ (D) $\alpha^2 - \beta^2 = 2$

35. Let z_1 be a complex number with $|z_1| = 1$ and z_2 be any complex number, then $\left|\frac{z_1 - z_2}{1 - z_1 \bar{z}_2}\right| =$

(A) 0 (B) 1

(C) – 1 (D) 2

36. $\arg\left(\frac{3+i}{2-i} + \frac{3-i}{2+i}\right)$ is equal to

(A) $\frac{\pi}{2}$ (B) $-\frac{\pi}{2}$

(C) 0 (D) $\frac{\pi}{4}$

37. If $z_1.z_2........z_n = z$, then $\arg z_1 + \arg z_2 + ... + \arg z_n$ and $\arg z$ differ by a

(A) Multiple of π (B) Multiple of $\frac{\pi}{2}$

(C) Greater than π (D) Less than π

38. Let z be a purely imaginary number such that $\text{Im}(z) > 0$. Then $\arg(z)$ is equal to

(A) π (B) $\frac{\pi}{2}$

(C) 0 (D) $-\frac{\pi}{2}$

39. Let z be a purely imaginary number such that $\text{Im}(z) < 0$. Then $\arg(z)$ is equal to

(A) π (B) $\frac{\pi}{2}$

(C) 0 (D) $-\frac{\pi}{2}$

40. If z is a purely real number such that $\text{Re}(z) < 0$, then $\arg(z)$ is equal to

(A) π (B) $\frac{\pi}{2}$

(C) 0 (D) $-\frac{\pi}{2}$

41. If $\arg z < 0$ then $\arg(-z) - \arg(z)$ is equal to

(A) π (B) $-\pi$

(C) $-\frac{\pi}{2}$ (D) $\frac{\pi}{2}$

42. The amplitude of $\frac{1+\sqrt{3}\,i}{\sqrt{3}-i}$ is

(A) 0 (B) $\pi/6$

(C) $\pi/3$ (D) $\pi/2$

43. If $z = \frac{-2}{1+\sqrt{3}\,i}$ then the value of $\arg(z)$ is [

(A) π (B) $\pi/3$

(C) $2\pi/3$ (D) $\pi/4$

44. If $z = \cos\frac{\pi}{6} + i\sin\frac{\pi}{6}$ then

(A) $|z| = 1, \ \arg z = \frac{\pi}{4}$

(B) $|z| = 1, \arg z = \frac{\pi}{6}$

(C) $|z| = \frac{\sqrt{3}}{2}, \arg z = \frac{5\pi}{24}$

(D) $|z| = \frac{\sqrt{3}}{2}, \ \arg z = \tan^{-1}\frac{1}{\sqrt{2}}$

45. The amplitude of $\sin\frac{\pi}{5} + i\left(1 - \cos\frac{\pi}{5}\right)$

(A) $\pi/5$ (B) $2\pi/5$

(C) $\pi/10$ (D) $\pi/15$

Square root, Representation and Logarithm of complex numbers

46. If $\sqrt{a+ib} = x + iy$, then possible value of $\sqrt{a-ib}$ is

(A) $x^2 + y^2$ (B) $\sqrt{x^2 + y^2}$

(C) $x + iy$ (D) $x - iy$

47. The number of non-zero integral solutions of the equation $|1-i|^x = 2^x$ is

(A) Infinite (B) 1

(C) 2 (D) None of these

48. $\frac{1+7i}{(2-i)^2} =$

(A) $\sqrt{2}\left(\cos\frac{3\pi}{4} + i\sin\frac{3\pi}{4}\right)$

(B) $\sqrt{2}\left(\cos\frac{\pi}{4} + i\sin\frac{\pi}{4}\right)$

(C) $\left(\cos\frac{3\pi}{4} + i\sin\frac{3\pi}{4}\right)$

(D) None of these

49. If $z = re^{i\theta}$, then $|e^{iz}| =$

(A) $e^{r\sin\theta}$ (B) $e^{-r\sin\theta}$

(C) $e^{-r\cos\theta}$ (D) $e^{r\cos\theta}$

50. $\frac{1-i}{1+i}$ is equal to

(A) $\cos\frac{\pi}{2} + i\sin\frac{\pi}{2}$ (B) $\cos\frac{\pi}{2} - i\sin\frac{\pi}{2}$

(C) $\sin\frac{\pi}{2} + i\cos\frac{\pi}{2}$ (D) None of these

51. The amplitude of $e^{e^{-i\theta}}$ is equal to

(A) $\sin\theta$ (B) $-\sin\theta$

(C) $e^{\cos\theta}$ (D) $e^{\sin\theta}$

52. If $z = \frac{1+i\sqrt{3}}{\sqrt{3}+i}$, then $(\bar{z})^{100}$ lies in

(A) I quadrant (B) II quadrant

(C) III quadrant (D) IV quadrant

53. If $x + \frac{1}{x} = \sqrt{3}$, then $x =$

(A) $\cos\frac{\pi}{3} + i\sin\frac{\pi}{3}$ (B) $\cos\frac{\pi}{2} + i\sin\frac{\pi}{2}$

(C) $\sin\frac{\pi}{6} + i\cos\frac{\pi}{6}$ (D) $\cos\frac{\pi}{6} + i\sin\frac{\pi}{6}$

54. $(-1+i\sqrt{3})^{20}$ is equal to

(A) $2^{20}(-1+i\sqrt{3})^{20}$ (B) $2^{20}(1-i\sqrt{3})^{20}$

(C) $2^{20}(-1-i\sqrt{3})^{20}$ (D) None of these

55. The imaginary part of $\tan^{-1}\left(\frac{5i}{3}\right)$ is

(A) 0 (B) ∞

(C) $\log 2$ (D) $\log 4$

Geometry of complex numbers

56. The vertices B and D of a parallelogram are $1-2i$ and $4+2i$, If the diagonals are at right angles and $AC = 2BD$, the complex number representing A is

(A) $\frac{5}{2}$ (B) $3i-\frac{3}{2}$

(C) $3i-4$ (D) $3i+4$

57. If z_1, z_2, z_3, z_4 are the affixes of four points in the Argand plane and z is the affix of a point such that $|z-z_1| = |z-z_2| = |z-z_3| = |z-z_4|$, then z_1, z_2, z_3, z_4 are

(A) Concyclic

(B) Vertices of a parallelogram

(C) Vertices of a rhombus

(D) In a straight line

58. ABCD is a rhombus. Its diagonals AC and BD intersect at the point M and satisfy $BD = 2AC$. If the points D and M represents the complex numbers $1+i$ and $2-i$ respectively, then A represents the complex number

(A) $3-\frac{1}{2}i$ or $1-\frac{3}{2}i$ (B) $\frac{3}{2}-i$ or $\frac{1}{2}-3i$

(C) $\frac{1}{2}-i$ or $1-\frac{1}{2}i$ (D) None of these

59. The complex numbers z_1, z_2, z_3 are the vertices of a triangle. Then the complex numbers z which make the triangle into a parallelogram is

(A) $z_1+z_2-z_3$ (B) $z_1-z_2+z_3$

(C) $z_2+z_3-z_1$ (D) All the above

60. The equation $z\bar{z}+(2-3i)z+(2+3i)\bar{z}+4=0$ represents a circle of radius

(A) 2 (B) 3

(C) 4 (D) 6

61. If z_1, z_2, z_3 are three collinear points in argand plane, then $\begin{vmatrix} z_1 & \bar{z}_1 & 1 \\ z_2 & \bar{z}_2 & 1 \\ z_3 & \bar{z}_3 & 1 \end{vmatrix} =$

(A) 0 (B) – 1

(C) 1 (D) 2

62. If z is a complex number in the Argand plane, then the equation $|z-2|+|z+2|=8$ represents

(A) Parabola (B) Ellipse

(C) Hyperbola (D) Circle

63. The points $1+3i, 5+i$ and $3+2i$ in the complex plane are

(A) Vertices of a right angled triangle

(B) Collinear

(C) Vertices of an obtuse angled triangle

(D) Vertices of an equilateral triangle

64. If z_1 and z_2 are two complex numbers, then $|z_1+z_2|$ is

(A) $\le |z_1|+|z_2|$ (B) $\le |z_1|-|z_2|$

(C) $< |z_1|+|z_2|$ (D) $> |z_1|+|z_2|$

65. If $z = x+iy$, then area of the triangle whose vertices are points z, iz and $z+iz$ is

(A) $2|z|^2$ (B) $\frac{1}{2}|z|^2$

(C) $|z|^2$ (D) $\frac{3}{2}|z|^2$

66. When $\frac{z+i}{z+2}$ is purely imaginary, the locus described by the point z in the Argand diagram is a

(A) Circle of radius $\frac{\sqrt{5}}{2}$

(B) Circle of radius $\frac{5}{4}$

(C) Straight line

(D) Parabola

67. If $|z+1|=\sqrt{2}\,|z-1|$, then the locus described by the point z in the Argand diagram is a

(A) Straight line (B) Circle

(C) Parabola (D) None of these

68. The region of the complex plane for which $\left|\frac{z-a}{z+a}\right|=1 \quad [R(a)\neq 0]$ is

(A) $x-\text{axis}$

(B) $y-\text{axis}$

(C) The straight line $x=a$

(D) None of these

69. The region of Argand plane defined by $|z-1|+|z+1|\leq 4$ is

(A) Interior of an ellipse

(B) Exterior of a circle

(C) Interior and boundary of an ellipse

(D) None of these

70. The locus of the points *z* which satisfy the condition *arg* $\left(\frac{z-1}{z+1}\right)=\frac{\pi}{3}$ is

(A) A straight line (B) A circle

(C) A parabola (D) None of these

71. Locus of the point *z* satisfying the equation $|iz-1|+|z-i|=2$ is

(A) A straight line

(B) A circle

(C) An ellipse

(D) A pair of straight lines

72. If $z=x+iy$ is a complex number satisfying $\left|z+\frac{i}{2}\right|^2=\left|z-\frac{i}{2}\right|^2$, then the locus of *z* is

(A) $2y=x$ (B) $y=x$

(C) *y*-axis (D) *x*-axis

73. The locus of the point *z* satisfying $\arg\left(\frac{z-1}{z+1}\right)=k$, (where *k* is non zero) is

(A) Circle with centre on *y*–axis

(B) Circle with centre on *x*–axis

(C) A straight line parallel to *x*–axis

(D) A straight line making an angle 60^o with the *x*–axis

74. If the amplitude of $z-2-3i$ is $\pi/4$, then the locus of $z=x+iy$ is

(A) $x+y-1=0$ (B) $x-y-1=0$

(C) $x+y+1=0$ (D) $x-y+1=0$

75. If $|z^2-1|=|z|^2+1$, then z lies on

(A) An ellipse

(B) The imaginary axis

(C) A circle

(D) The real axis

De Moivre's theorem and Roots of unity

76. If $\left(\frac{1+\cos\theta+i\sin\theta}{i+\sin\theta+i\cos\theta}\right)^4=\cos n\theta+i\sin n\theta$, then n is equal to

(A) 1 (B) 2

(C) 3 (D) 4

77. The value of expression $\left(\cos\frac{\pi}{2}+i\sin\frac{\pi}{2}\right)\left(\cos\frac{\pi}{2^2}+i\sin\frac{\pi}{2^2}\right)$........to ∞ is

(A) -1 (B) 1

(C) 0 (D) 2

78. $\left(\dfrac{\cos\theta + i\sin\theta}{\sin\theta + i\cos\theta}\right)^4$ equals

(A) $\sin 8\theta - i\cos 8\theta$ (B) $\cos 8\theta - i\sin 8\theta$

(C) $\sin 8\theta + i\cos 8\theta$ (D) $\cos 8\theta + i\sin 8\theta$

79. If $\sin\alpha + \sin\beta + \sin\gamma = 0 = \cos\alpha + \cos\beta + \cos\gamma$, then the value of $\sin^2\alpha + \sin^2\beta + \sin^2\gamma$ is

(A) 2/3 (B) 3/2

(C) 1/2 (D) 1

80. If $\cos\alpha + \cos\beta + \cos\gamma = 0 = \sin\alpha + \sin\beta + \sin\gamma$ then $\cos 2\alpha + \cos 2\beta + \cos 2\gamma$ equals

(A) $2\cos(\alpha+\beta+\gamma)$ (B) $\cos 2(\alpha+\beta+\gamma)$

(C) 0 (D) 1

81. $\left(\dfrac{1+\sin\theta + i\cos\theta}{1+\sin\theta - i\cos\theta}\right)^n =$

(A) $\cos\left(\dfrac{n\pi}{2} - n\theta\right) + i\sin\left(\dfrac{n\pi}{2} - n\theta\right)$

(B) $\cos\left(\dfrac{n\pi}{2} + n\theta\right) + i\sin\left(\dfrac{n\pi}{2} + n\theta\right)$

(C) $\sin\left(\dfrac{n\pi}{2} - n\theta\right) + i\cos\left(\dfrac{n\pi}{2} - n\theta\right)$

(D) $\cos n\left(\dfrac{\pi}{2} + 2\theta\right) + i\sin n\left(\dfrac{\pi}{2} + 2\theta\right)$

82. If *n* is a positive integer, then $(1+i)^n + (1-i)^n$ is equal to

(A) $(\sqrt{2})^{n-2}\cos\left(\dfrac{n\pi}{4}\right)$

(B) $(\sqrt{2})^{n-2}\sin\left(\dfrac{n\pi}{4}\right)$

(C) $(\sqrt{2})^{n+2}\cos\left(\dfrac{n\pi}{4}\right)$

(D) $(\sqrt{2})^{n+2}\sin\left(\dfrac{n\pi}{4}\right)$

83. If $\dfrac{1}{x} + x = 2\cos\theta$, then $x^n + \dfrac{1}{x^n}$ is equal to

(A) $2\cos n\theta$ (B) $2\sin n\theta$

(C) $\cos n\theta$ (D) $\sin n\theta$

84. If $iz^4 + 1 = 0$, then z can take the value

(A) $\dfrac{1+i}{\sqrt{2}}$ (B) $\cos\dfrac{\pi}{8} + i\sin\dfrac{\pi}{8}$

(C) $\dfrac{1}{4i}$ (D) i

85. The two numbers such that each one is square of the other, are

(A) ω, ω^3 (B) $-i, i$

(C) $-1, 1$ (D) ω, ω^2

86. If ω is a complex cube root of unity, then $(1+\omega)(1+\omega^2)\quad(1+\omega^4)(1+\omega^8)\ldots$ to 2n factors =

(A) 0 (B) 1

(C) -1 (D) None of these

87. The product of all the roots of $\left(\cos\dfrac{\pi}{3} + i\sin\dfrac{\pi}{3}\right)^{3/4}$ is

(A) -1 (B) 1

(C) $\dfrac{3}{2}$ (D) $-\dfrac{1}{2}$

88. If ω is a cube root of unity, then a root of the equation $\begin{vmatrix} x+1 & \omega & \omega^2 \\ \omega & x+\omega^2 & 1 \\ \omega^2 & 1 & x+\omega \end{vmatrix} = 0$ is

(A) $x = 1$ (B) $x = \omega$

(C) $x = \omega^2$ (D) $x = 0$

89. If $x = a + b, y = a\alpha + b\beta$ and $z = a\beta + b\alpha$, where α and β are complex cube roots of unity, then xyz =

(A) $a^2 + b^2$ (B) $a^3 + b^3$

(C) a^3b^3 (D) $a^3 - b^3$

90. If $x = a + b, y = a\omega + b\omega^2, z = a\omega^2 + b\omega$, then the value of $x^3 + y^3 + z^3$ is equal to

(A) $a^3 + b^3$ (B) $3(a^3 + b^3)$

(C) $3(a^2 + b^2)$ (D) None of these

91. The n^{th} roots of unity are in

(A) A.P. (B) G.P.

(C) H.P. (D) None of these

92. If $1, \omega, \omega^2$ are the three cube roots of unity, then $(3 + \omega^2 + \omega^4)^6 =$

(A) 64 (B) 729

(C) 2 (D) 0

93. $(1 - \omega + \omega^2)(1 - \omega^2 + \omega^4)(1 - \omega^4 + \omega^8)$.......... to $2n$ factors is

(A) 2^n (B) 2^{2n}

(C) 0 (D) 1

94. Let $\Delta = \begin{vmatrix} 1 & \omega & 2\omega^2 \\ 2 & 2\omega^2 & 4\omega^3 \\ 3 & 3\omega^3 & 6\omega^4 \end{vmatrix}$ where ω is the cube root of unity, then

(A) $\Delta = 0$ (B) $\Delta = 1$

(C) $\Delta = 2$ (D) $\Delta = 3$

95. If n is a positive integer greater than unity and z is a complex number satisfying the equation $z^n = (z + 1)^n$, then

(A) $\text{Re}(z) < 0$ (B) $\text{Re}(z) > 0$

(C) $\text{Re}(z) = 0$ (D) None of these

96. $\left(\frac{\sqrt{3} + i}{2}\right)^6 + \left(\frac{i - \sqrt{3}}{2}\right)^6$ is equal to

(A) -2 (B) 0

(C) 2 (D) 1

97. If ω is an imaginary cube root of unity, $(1 + \omega - \omega^2)^7$ equals

(A) 128ω (B) -128ω

(C) $128\omega^2$ (D) $-128\omega^2$

98. $\frac{(-1 + i\sqrt{3})^{15}}{(1 - i)^{20}} + \frac{(-1 - i\sqrt{3})^{15}}{(1 + i)^{20}}$ is equal to

(A) – 64 (B) – 32

(C) – 16 (D) $\frac{1}{16}$

99. If $\pi / 3$ is a complex root of the equation $z^3 = 1$, then $\omega + \omega^{\left(\frac{1}{2} + \frac{3}{8} + \frac{9}{32} + \frac{27}{128} + ...\right)}$ is equal to

(A) – 1 (B) 0

(C) 9 (D) i

100. If cube root of 1 is ω, then the value of $(3 + \omega + 3\omega^2)^4$ is

(A) 0 (B) 16

(C) 16ω (D) $16\omega^2$

101. The value of $(8)^{1/3}$ is

(A) $-1 + i\sqrt{3}$ (B) $-1 - i\sqrt{3}$

(C) 2 (D) All of these

102. If ω is a complex cube root of unity, then $225 + (3\omega + 8\omega^2)^2 + (3\omega^2 + 8\omega)^2 =$

(A) 72 (B) 192

(C) 200 (D) 248

103. If $1, \omega, \omega^2$ are the cube roots of unity, then

$$\Delta = \begin{vmatrix} 1 & \omega^n & \omega^{2n} \\ \omega^n & \omega^{2n} & 1 \\ \omega^{2n} & 1 & \omega^n \end{vmatrix} =$$

(A) 0 (B) 1

(C) ω (D) ω^2

104. If $\omega = \frac{-1 + \sqrt{3}i}{2}$ then $(3 + \omega + 3\omega^2)^4 =$

(A) 16 (B) –16

(C) 16 ω (D) $16\omega^2$

105. If $1, \omega, \omega^2$ are the roots of unity, then $(1 - 2\omega + \omega^2)^6$ is equal to

(A) 729 (B) 246

(C) 243 (D) 81