COMPLEX NUMBERS

1) INTERGAL POWER OF IOTA, EQUALITY OF COMPLEX NUMBERS

Q.1) If $\left(\frac{1-i}{1+i}\right)^{200} = a + ib$

a) a = 2 b = -1

b) a = 1 b = 0

c) a = 0 b = 1

d) a = -1 b = 2

2) The sum of the series $i^2 + i^4 + i^6 + \cdots$ (2n + 1) terms is

a) 0 b) n c) 1 d) -1

Q. 3) If $(x + iy)^{1/3} = 2 + 3i$, then $3x + 2y$ is equal to

a) -20 b) -60 c) -120 d) 60

Q.4) The value of $\sum_{n=0}^{\infty} \left[\frac{2i}{3}\right]^n$ is

a) $\frac{9 + 6i}{13}$ b) $\frac{9 - 6i}{3}$ c) 9 + 6i d) 9 – 6i

Q.5) The complex number $\dfrac{2^n}{(1+i)^{2n}} + \dfrac{(1+i)^{2n}}{2^n}$

, $n \in I$ is equal to

a) 0 b) 2 c) $\{1 + (-1)^n\} i^n$ d) $\{1 - (-1)^n\} i^n$

(II) Conjugate, Modules and Argument of complex numbers.

6) The argument of the complex number $\frac{13 - 5i}{4 - 9i}$ is

a) $\frac{\pi}{3}$ b) $\frac{\pi}{4}$ c) $\frac{\pi}{5}$ d) $\frac{\pi}{6}$

7) If $z = \sqrt{3} + i$, then the argument of $z^2 e^{z-i}$ is equal to

a) $\frac{\pi}{2}$ b) $\frac{\pi}{6}$ c) $e^{\pi/6}$ d) $\frac{\pi}{3}$

8) The modulus of the complex number z,such that

$|Z + 3 - i| = 1$ and arg z = π is equal to

a) 1 b) 3 c) 9 d) 4

9)The solution of the equation $|z| - z = 1 + 2i$ is

a) $\frac{3}{2} + 2i$ b) $\frac{3}{2} - 2i$ c) 3 – 2i d) 3 + 2i

10) If $\frac{5z_2}{11z_1}$ is purely imaginary, then the value of

$$\left|\frac{2Z_1+3Z_2}{2Z_1-3Z_2}\right|$$ is

a) $\frac{37}{33}$ b) 2 c) 1 d) 3

11) If z is any complex number and $\bar{z}$ is its conjugate, then $\dfrac{\bar{z}}{|z|^2}$ =

a) $\dfrac{1}{z}$ b) $\dfrac{-1}{z}$ c) $\dfrac{1}{z}$ 4) $\dfrac{-1}{z}$

12) The complex number sinx +icos2x and Cosx -isin2x are conjugate to each other for

a) $x = n\pi$

b) $x = (n+1/2)\pi$

c) $x = 0$

d) No value of x.

13) If $z = r\,[\cos\theta + i\sin\theta]$, then the value of

$$\frac{z}{\bar{z}} + \frac{\bar{z}}{z} \text{ is}$$

a) $\cos 2\theta$ b) $2\cos 2\theta$ c) $2\cos\theta$ d) $2\sin\theta$

14) If $z = re^{i\theta}$, then $\left|e^{iz}\right| = 0$

a) $e^{r}\sin\theta$ b) $e^{-r}\sin\theta$ c) $e^{-r}\cos\theta$ d) $e^{r}\cos\theta$

15) If $(\sqrt{5} + \sqrt{3}i)^{33} = 2^{49}z$, then modulus of the complex number z is equal to

a) 1 b) $\sqrt{2}$ c) $2\sqrt{2}$ d) 4

Real and imaginary parts of complex numbers

16) If $z = \bar{z}$ then

a) z is purely real
b) z is purely imaginary
c) Real part of z = imaginary part of z
d) z is a complex number.

17) The imaginary part of $e^{e^{i\theta}}$ is

a) θ

b) $e^{\cos\theta}\sin(\sin\theta)$

c) $e^{\cos\theta}\cos(\sin\theta)$

d) $e^{e^{i\theta}}$

18)Let $z = \dfrac{11 - 3i}{1 + i}$, If α is real numbers, such that $z - i\alpha$ is real, then the value of α is

a) 4 b) -4 c) 7 d) -7

19)If z is a complex number such that Re(z) = Im(z), then

a) $Rez^2 = 0$

b) $Imz^2 = 0$

c) $Rez^2 = Imz^2$

d) $Rez^2 = - Imz^2$

20) Real part of log $(1 - i\sqrt{3})$

a) 1 b) log 2 c) $-\pi/3$ d) $\pi/2$

DE MOIVRE'S THEOREM AND ROOTS OF UNITY

21) If $z_r = \cos \frac{r\alpha}{n^2} + i\sin \frac{r\alpha}{n^2}$, where

$r = 1, 2 \ldots\ldots\ldots\ldots n$

$\lim\limits_{n \to \infty} z_1 z_2 z_3 \ldots\ldots\ldots\ldots\ldots\ldots\ldots z_n =$

a) $\cos\alpha + i\sin\alpha$

b) $\cos\frac{\alpha}{2} - i\sin\frac{\alpha}{2}$

c) $e^{i\alpha/2}$

d) $3\sqrt{e^{i\alpha}}$

22) $(\sin\theta + i\cos\theta)^{17} =$

a) $\sin 17\theta - i\cos 17\theta$

b) $\cos 17\theta + i\sin 17\theta$

c) $\sin 17\theta + i\cos 17\theta$

d) $\cos 17\theta - i\sin 17\theta$

23) The product of 10^{th} roots of 7 is

a) $7 \text{ cis} \frac{\pi}{10}$ b) 7 c) -7 d) 14

24) If α is the cube roots of -1 then

a) $1 + \alpha + \alpha^2 = 0$

b) $\alpha^2 - \alpha + 1 = 0$

c) $\alpha^2 + 2\alpha + 1$

d) $\alpha^2 + 2\alpha - 1 = 0$

25) $$\left(\frac{1 + \cos\frac{\pi}{8} + i\sin\frac{\pi}{8}}{1 + \cos\frac{\pi}{8} - i\sin\frac{\pi}{8}}\right)^{80} =$$

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

26) If ω is a complex cube roots of unity, then the value of

$$\omega + \omega^{1/2+3/8+9/32+27/128+\ldots\ldots\ldots\ldots}$$

a) 1 b) ω c) $\omega 2$ d) -1

27) if $iz^4 + 1 = 0$ then z can take the value

a) $\frac{1+I}{\sqrt{2}}$ b) $cis\frac{\pi}{8}$ c) $\frac{1}{4i}$ d) i

28) If $x = \alpha + \beta$, $y = \alpha\omega + \beta\omega^2$, $z = \alpha\omega^2 + \beta\omega$ Where ω is cube roots of unity, then value of xyz is

a) $\alpha^2 + \beta^2$ b) $\alpha^2 - \beta^2$

c) $\alpha^3 + \beta^3$ d) $\alpha^3 - \beta^3$

29) The complex numbers 1 , -1, i√3 form a triangle which is

a) right angled
b) isosceles
c) equilaterial
d) isosceles right angled

30) If $\left|\frac{z-2}{z-3}\right| = 2$ represents a circle, then its radius is equal to

a) $\frac{1}{3}$ b) $\frac{3}{4}$ c) $\frac{2}{3}$ d) 1

31) Suppose z_1, z_2 , z_3 are the vertices of an equilateral triangle inscribed in the circle $|z| = 2$ if $z_1 = 1 + i\sqrt{3}$ and z_1 , z_2, z_3 are in Clock wise sense, then z_2 is

a) $1 - \sqrt{3}i$ b) 2 c) $-1 + \sqrt{3}i$ d) $-1 - \sqrt{3}i$

OTHER AND MIXED TYPES :-

32) $(1 +i)^6 + (1-i)^3 =$

a) $2 + i$ b) $2 - 10i$ c) $-2 + I$ d) $-2 - 10i$

33) If $x+iy = \dfrac{1}{1+\cos\theta+i\sin\theta}$ then $x^2 =$

a) $\dfrac{1}{2}$ b) $\dfrac{1}{3}$ c) $\dfrac{1}{4}$ d) $\dfrac{1}{8}$

34) If n is any integar , i^n is

a) 1, -1, i, -I b) i, -I c) 1,-1 d) i

35)If $n = 4m + 3$, m is an integer the i^n is

a) i b) -i c) -1 d) 1

36) If $z = \frac{\sqrt{3} + i}{2}$, then z^{69} is equal to

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

37) The value of $\left[\dfrac{1+i\sqrt{3}}{1-i\sqrt{3}}\right]^6 + \left[\dfrac{1-i\sqrt{3}}{1+i\sqrt{3}}\right]^6$ is

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

38) If ω is a complex cube roots of unity then $\sin[(\omega^{10} + \omega^{23})\pi - \pi/4]$ is equal to

a) $\frac{1}{\sqrt{2}}$ b) $\frac{1i}{\sqrt{2}}$ c) 1 d) $\frac{\sqrt{3}}{2}$

39) The square root of $-7 + 24i$ is $x + iy$ then x

a) ± 1 b) ± 2 c) ± 3 d) ± 4

40) The value of $e^{2+i\pi/3} + e^{2-i\pi/3}$

a) 1 b) e^2 c) $2e^2$ d) $i\sqrt{3}$

42) If $\frac{1 + i\cos\theta}{2 + i\cos\theta}$ is purely real then θ =

a) $n\pi \pm \pi/2$

b) $2n\pi \pm \pi/2$

c) $n\pi \pm 1$

d) $2n\pi \pm \pi$

43) If $a = cis\alpha$, $b = cis\beta$, $c = cis\,\gamma$ and $\frac{a}{b} + \frac{b}{c} + \frac{c}{a} = 1$

Then $\sum \sin(\alpha - \beta) =$

a) $\frac{3}{2}$ b) $\frac{1}{2}$ c) 1 d) 0

44) If $|z^2 - 1| = |z|^2 + 1$, then z lies on

a) a circle
b) $x = 0$
c) a parabola
d) $y = 0$

45) The value of $\dfrac{i^{592} + i^{590} + i^{588}}{i^{582} + i^{580} + i^{578}} + 1$ is

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

46) The value of $\sum_{K=1}^{\infty} \left(\sin\frac{2\pi k}{11} - i\cos\frac{2\pi k}{11}\right)$ is

a) 1 b) -1 c) i d) -i

47) The common roots of the equations $z^3 + 2z^2 + 2z + 1 = 0$ and $z^{1985} + z^{100} + 1 = 0$ are

a) $-1, \omega$ b) $-1, \omega^2$ c) ω, ω^2 d) $1, \omega^2$

48) The equation $|(z-1)|^2 + |(z+1)|^2 = 4$ represents on the argand plane

a) a straight line
b) an ellipse
c) a circle with centre origin and radius 2
d) a circle with centre origin and radius unity

49) arg bi (b>0) is

a) π b) $\pi/2$ c) $-\pi/2$ d) 0

50) For the +ve integer n, the expression

$$(1 - i)^n \left(1 - \frac{1}{i}\right)^n =$$

a) 0 b) $2i^n$ c) 2^n d) 4^n

51) $\begin{vmatrix} 1 & 1 & 1 \\ 1 & \omega^2 & \omega \\ 1 & \omega & \omega^2 \end{vmatrix} =$

a) $3\sqrt{3}i$ b) $-3\sqrt{3}i$ c) $i\sqrt{3}$ d) 3

52) Let $a_n = i^{(n+1)^2}$ where $i = \sqrt{-1}$ and $n = 1, 2, 3$..................... then the values of

$a_1 + a_2 + a_3 + ... + a_{25}$ is

a) 13 b) 13 + i c) 13 -i d) 12

53) The additive inverse of 1 -i is

a) 0 + 0i b) -1 + i c) -1 – i d) 1 - i

54) one of the value of $\left[\dfrac{1+i}{\sqrt{2}}\right]^{2/3}$

a) $\sqrt{3} + i$ b) $-i$ c) i d) $-\sqrt{3} + i$

$$55\ \frac{(\cos 2\theta + i\sin 2\theta)(\cos 75 + i\sin 75)(\cos 10 + i\sin 10)}{(\sin 15 - i\cos 15)}$$

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

56) $\sqrt{i} - \sqrt{-i}$ is equal to

a) $\pm i\sqrt{2}$ b) $\dfrac{1}{\pm i\sqrt{2}}$ c) 0 d) $\pm\sqrt{2}$

57) The value of $\left[i^{99} + \left[\frac{1}{i} \right]^{25} \right]^{2}$ is

a) -4 b) 4 c) 2 d) -2

58) If $iz^3 + z^2 - z + i = 0$ then $|z| =$

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

59) If $\begin{vmatrix} 60 & -i & 1 \\ 7 & i & -1 \\ 7i & 1 & i \end{vmatrix} = x + iy$ then

a) x=3, y=1

b) x=1, y=3

c) x=0, y=3

d) x=0, y=0

60) If $z_r = \cos\frac{\pi}{3^r} + i\sin\frac{\pi}{3^r}$, r= 1, 2,3 ......then

$z_1, z_2, z_3 \ldots\ldots\infty$

a) i   b) -i   c) 1   d) -1

61) The value of $\log i^i$ is

a) ω b) $-\omega^2$ c) $\pi/2$ d) $-\pi/2$

62) $\left[\dfrac{-1 + i\sqrt{3}}{2}\right]^{65n} + \left[\dfrac{-1 - i\sqrt{3}}{2}\right]^{65n} =$

a) 1   b) 2   c) 3   d) ω^2

63) Let z, ω be complex numbers , suchthat $\overline{z} + i\,\overline{\omega} = 0$ and $\arg z\omega = \pi$

Then arg z =

a) 5π/4 b) π/2 c) 3π/4 d) π/4

64) If ω is a complex cube root of unity, then $(3 + \omega + 2\omega^2)^4$ equals

a) 1 b) ω^2 c) 9ω d) $9\omega^2$

65 The value of amp $(i\ \omega)$ + amp $(i\ \omega^2)$ where $i = \sqrt{-1}$ and ω = non zero real number

a) 0 b) $\pi/2$

c) π d) $-\pi$

66) If $x + \frac{1}{x} = 2\cos\theta$, & $y + \frac{1}{y} = 2\cos\Phi$ Then $2\cos(\theta + \Phi) =$

a) $\frac{1}{x^2+xy}$

b) $xy + \frac{1}{xy}$

c) $(x+\frac{1}{x})(y+\frac{1}{y})$

d) $xy - \frac{1}{xy}$

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

a) 128ω

b) -128ω

c) $128\omega^2$

d) $-128\omega^2$

68). If α is the complex number such that $\alpha^2 + \alpha + 1 = 0$ then α^{31} is

a) 1 b) 0 c) α^2 d) α

69).The curve represents $Re(z^2) = 4$ is

a parabola

b) an ellipse

c) circle

d) a rectangular hyperbola.

69).The conjugate of (1+2i)(2-3i) is

a) - 4 + i

b) -4 – i

c) 8 +i

d) 8 - i

70).If $\left[\frac{1+i}{1-i}\right]^3 - \left[\frac{1-i}{1+i}\right]^3 = x+iy$

Then (x, y) =

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

71). If $x = -1 - i\sqrt{3}$ then x^3 is

a) 8 b) -8 c) 1 d) -1

72). The value of $\sqrt{2i}$

a) 1+i   b) -1- i   c) $-\sqrt{2i}$ d) $\pm(1+i)$

73)Let z=x+iy and $z.\overline{z}=0$

Then

a) Re(z)=0

b) z=0

c) Ip(z)=0

d) z=-1

74) If $\omega \neq 1$, the least +ve value of n, for Which $(1 + \omega^2)^n = (1 + \omega^4)^n$

a) 1 b) 2 c) 3 d) 4

75). The amp of $(-i)^5$

a) $-\pi$ b) π c) $\pi/2$ d) $-\pi/2$