COMPLEX NUMBERS

PREVIOUSLY ASKED QUESTIONS

PART 1

1. $\sqrt{-2}\sqrt{-3} =$ **[Roorkee 1978]**

   (a) $\sqrt{6}$ (b) $-\sqrt{6}$

   (c) $i\sqrt{6}$ (d) None of these

2. If n is a positive integer, then which of the following relations is false

   (a) $i^{4n} = 1$ (b) $i^{4n-1} = i$

   (c) $i^{4n+1} = i$ (d) $i^{-4n} = 1$

3. If n is a positive integer, then $\left(\frac{1+i}{1-i}\right)^{4n+1}$ =

   (a) 1 (b) -1

   (c) i (d) $-i$

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

   [IIT 1982; MNR 1984; UPSEAT 2001; MP PET 2002]

   (a) 2 (b) 4

   (c) 8 (d) None of these

5. If $(1-i)^n = 2^n,$ then $n =$ **[RPET 1990]**

   (a) 1 (b) 0

   (c) -1 (d) None of these

6. The value of $(1+i)^5 \times (1-i)^5$ is **[Karnataka CET 1992]**

   (a) -8 (b) $8i$

(c) 8 (d) 32

7. $\left(\frac{1+i}{1-i}\right)^2+\left(\frac{1-i}{1+i}\right)^2$ is equal to

(a) $2i$ (b) $-2i$

(c) -2 (d) 2

8. The value of $\frac{i^{592}+i^{590}+i^{588}+i^{586}+i^{584}}{i^{582}+i^{580}+i^{578}+i^{576}+i^{574}}-1=$

(a) -1 (b) -2

(c) -3 (d) -4

9. $1+i^2+i^4+i^6+.....+i^{2n}$ is **[EAMCET 1980]**

(a) Positive (b) Negative

(c) Zero (d) Cannot be determined

10. $i^2+i^4+i^6+.....$ upto $(2n+1)$ terms =

[EAMCET 1980; Kerala (Engg.) 2005]

(a) i (b) $-i$

(c) 1 (d) -1

11. If $i=\sqrt{-1}$, then $1+i^2+i^3-i^6+i^8$ is equal to **[RPET 1995]**

(a) $2-i$ (b) 1

(c) 3 (d) -1

12. If $i^2=-1$, then the value of $\sum_{n=1}^{200} i^n$ is **[MP PET 1996]**

(a) 50 (b) -50

(c) 0 (d) 100

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

[IIT 1998]

(a) i (b) $i-1$

(c) $-i$ (d) 0

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

[Roorkee 1998]

(a) 2 (b) 3

(c) 4 (d) 5

15. The value of $i^{1+3+5+...+(2n+1)}$ is [AMU 1999]

(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

16. If $x+\frac{1}{x}=2\cos\theta,$ then x is equal to [RPET 2001]

(a) $\cos\theta+i\sin\theta$ (b) $\cos\theta-i\sin\theta$

(c) $\cos\theta\pm i\sin\theta$ (d) $\sin\theta\pm i\cos\theta$

17. The value of $i^n+i^{n+1}+i^{n+2}+i^{n+3},(n\in N)$ is [RPET 2001]

(a) 0 (b) 1

(c) 2 (d) None of these

18. The value of $(1+i)^8+(1-i)^8$ is [RPET 2001; KCET 2001]

(a) 16 (b) -16

(c) 32 (d) -32

19. $(1+i)^{10}$, where $i^2=-1,$ is equal to [AMU 2001]

(a) $32i$ (b) $64 + i$

(c) $24i - 32$ (d) None of these

20. The value of $(1+i)^6 + (1-i)^6$ is **[RPET 2002]**

(a) 0 (b) 2^7

(c) 2^6 (d) None of these

21. If $i^2 = -1$, then sum $i + i^2 + i^3 + \ldots$ to 1000 terms is equal to

[Kerala (Engg.) 2002]

(a) 1 (b) -1

(c) i (d) 0

22. If $x = 3 + i$, then $x^3 - 3x^2 - 8x + 15 =$ **[UPSEAT 2003]**

(a) 6 (b) 10

(c) -18 (d) -15

23. The smallest positive integer n for which $(1+i)^{2n} = (1-i)^{2n}$ is

[Karnataka CET 2004]

(a) 1 (b) 2

(c) 3 (d) 4

24. The values of x and y satisfying the equation $\frac{(1+i)x - 2i}{3+i} + \frac{(2-3i)y + i}{3-i} = i$ are

[IIT 1980; MNR 1987]

(a) $x = -1, y = 3$ (b) $x = 3, y = -1$

(c) $x = 0, y = 1$ (d) $x = 1, y = 0$

25. If z_1 and z_2 be two complex number, then $\text{Re}(z_1 z_2) =$

(a) $\text{Re}(z_1).\text{Re}(z_2)$ (b) $\text{Re}(z_1).\text{Im}(z_2)$

(c) $\text{Im}(z_1).\text{Re}(z_2)$ (d) None of these

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

[Roorkee 1979; RPET 1999; Pb. CET 2003]

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

27. Additive inverse of $1-i$ is

(a) $0+0i$ (b) $-1-i$

(c) $-1+i$ (d) None of these

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

(a) $-1/5$ (b) 1/5

(c) 1/10 (d) –1/10

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

(a) $(2,-1)$ (b) $(-2,1)$

(c) $(-2,-1)$ (d) (2, 1)

30. $\frac{3+2i\sin\theta}{1-2i\sin\theta}$ will be real, if θ = **[IIT 1976; EAMCET 2002]**

(a) $2n\pi$ (b) $n\pi+\frac{\pi}{2}$

(c) $n\pi$ (d) None of these

[Where n is an integer]

31. $\frac{\sqrt{5+12i}+\sqrt{5-12i}}{\sqrt{5+12i}-\sqrt{5-12i}}=$

(a) $-\frac{3}{2}i$ (b) $\frac{3}{2}i$

(c) $-\frac{3}{2}$ (d) $\frac{3}{2}$

32. If z and z' are complex numbers such that $z.z'=z$, then $z'=$

(a) $0+i0$ (b) $1+0i$

(c) $0+i$ (d) $1+i$

33. If $a^2+b^2=1,$ then $\frac{1+b+ia}{1+b-ia}=$

(a) 1 (b) 2

(c) $b+ia$ (d) $a+ib$

34. $\frac{3+2i\sin\theta}{1-2i\sin\theta}$ will be purely imaginary, if $\theta=$

[IIT 1976; Pb. CET 2003]

(a) $2n\pi\pm\frac{\pi}{3}$ (b) $n\pi+\frac{\pi}{3}$

(c) $n\pi\pm\frac{\pi}{3}$ (d) None of these

[Where n is an integer]

35. The real part of $(1-\cos\theta+2i\sin\theta)^{-1}$ is **[IIT 1978, 86]**

(a) $\frac{1}{3+5\cos\theta}$ (b) $\frac{1}{5-3\cos\theta}$

(c) $\frac{1}{3-5\cos\theta}$ (d) $\frac{1}{5+3\cos\theta}$

36. If $(x+iy)^{1/3}=a+ib,$ then $\frac{x}{a}+\frac{y}{b}$ is equal to

[IT 1982; Karnataka CET 2000]

(a) $4(a^2+b^2)$ (b) $4(a^2-b^2)$

(c) $4(b^2-a^2)$ (d) None of these

37. $\left\{\frac{2i}{1+i}\right\}^2=$ **[BIT Ranchi 1992]**

(a) 1 (b) $2i$

(c) $1-i$ (d) $1-2i$

38. The real values of x and y for which the equation is $(x+iy)(2-3i) = 4+i$ is satisfied, are **[Roorkee 1978]**

(a) $x=\frac{5}{13}, y=\frac{8}{13}$ (b) $x=\frac{8}{13}, y=\frac{5}{13}$

(c) $x=\frac{5}{13}, y=\frac{14}{13}$ (d) None of these

39. The real values of x and y for which the equation $(x^4+2xi)-(3x^2+yi)=(3-5i)+(1+2yi)$ is satisfied, are **[Roorkee 1984]**

(a) $x=2, y=3$ (b) $x=-2, y=\frac{1}{3}$

(c) Both (a) and (b) (d) None of these

40. The imaginary part of $\frac{(1+i)^2}{(2-i)}$ is

(a) $\frac{1}{5}$ (b) $\frac{3}{5}$

(c) $\frac{4}{5}$ (d) None of these

41. 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

42. If $\frac{5(-8+6i)}{(1+i)^2} = a+ib$, then (a,b) equals **[RPET 1986]**

(a) (15, 20) (b) (20, 15)

(c) $(-15, 20)$ (d) None of these

43. The true statement is **[Roorkee 1989]**

(a) $1-i<1+i$ (b) $2i+1>-2i+1$

(c) $2i>1$ (d) None of these

44. $\frac{1-2i}{2+i}+\frac{4-i}{3+2i}=$ **[RPET 1987]**

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

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

(a) $b=0,c=0$ (b) $b=0,d=0$

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

46. If $x+iy=\frac{3}{2+\cos\theta+i\sin\theta}$, then x^2+y^2 is equal to

(a) $3x-4$ (b) $4x-3$

(c) $4x+3$ (d) None of these

47. If $\frac{(p+i)^2}{2p-i}=\mu+i\lambda$, then $\mu^2+\lambda^2$ is equal to

(a) $\frac{(p^2+1)^2}{4p^2-1}$ (b) $\frac{(p^2-1)^2}{4p^2-1}$

(c) $\frac{(p^2-1)^2}{4p^2+1}$ (d) $\frac{(p^2+1)^2}{4p^2+1}$

48. If $z=3-4i$, then $z^4-3z^3+3z^2+99z-95$ is equal to

(a) 5 (b) 6

(c) – 5 (d) – 4

49. If $z_1=1-i$ and $z_2=-2+4i$, then $\text{Im}\left(\frac{z_1z_2}{z_1}\right)=$

(a) 1 (b) 2

(c) 3 (d) 4

50. If $\frac{3x+2iy}{5i-2}=\frac{15}{8x+3iy}$, then

(a) $x=1,y=-3$

(b) $x=-1,y=3$

(c) $x = 1, y = 3$

(d) $x = -1, y = -3$ or $x = 1,\ y = 3$