WORKSHEET DAY 6
(Question asked in previous AIEEE & IIT-JEE)

SECTION - A

Q.1 Let z and w are two non zero complex number such that $|z| = |w|$, and $\text{Arg}(z) + \text{Arg}(w) = \pi$ then - **[AIEEE - 2002, IIT-95]**

(A) $z = w$ (B) $z = \overline{w}$

(C) $\overline{z} = \overline{w}$ (D) $z = -\overline{w}$

Q.2 If $|z - 2| \geq |z - 4|$ then correct statement is- **[AIEEE - 2002]**

(A) $R(z) \geq 3$ (B) $R(z) \leq 3$

(C) $R(z) \geq 2$ (D) $R(z) \leq 2$

Q.3 If z and ω are two non- zero comlex numbers such that $|z\omega| = 1$, and $\text{Arg}(z) - \text{Arg}(\omega) = \frac{\pi}{2}$, then $\overline{z}\,\omega$ is equal to- **[AIEEE - 2003]**

(A) $-i$ (B) 1

(C) -1 (D) i

Q.4 Let z_1 and z_2 be two roots of the equation $z^2 + az + b = 0$, z being complex. Further assume that the origin, z_1 and z_2 form an equilateral triangle. Then **[AIEEE - 2003]**

(A) $a^2 = 4b$ (B) $a^2 = b$

(C) $a^2 = 2b$ (D) $a^2 = 3b$

Q.5 If $\left(\frac{1+i}{1-i}\right)^x = 1$, then **[AIEEE - 2003]**

(A) x = 2n + 1, where n is any positive integer

(B) x = 4n, where n is any positive integer

(C) x = 2n, where n is any positive integer

(D) x = 4n + 1, where n is any positive integer

Q.6 Let z, w be complex numbers such that $\overline{z} + i\overline{w} = 0$ and arg zw = π. Then arg z equals- **[AIEEE - 2004]**

(A) $\pi/4$ (B) $\pi/2$

(C) $3\pi/4$ (D) $5\pi/4$

Q.7 If $z = x - iy$ and $z^{\frac{1}{3}} = p + iq$, then $\frac{\left(\frac{x}{p} + \frac{y}{q}\right)}{\left(p^2 + q^2\right)}$ is equal to- **[AIEEE - 2004]**

(A) 1 (B) -1

(C) 2 (D) -2

Q.8 If $|z^2 - 1| = |z|^2 + 1$, then z lies on- **[AIEEE - 2004]**

(A) the real axis

(B) the imaginary axis

(C) a circle

(D) an ellipse

Q.9 If z_1 and z_2 are two non-zero complex numbers such that $|z_1 + z_2| = |z_1| + |z_2|$, then arg z_1 – arg z_2 is equal to - **[AIEEE - 2005]**

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

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

Q.10 If $w = \frac{z}{z - \frac{1}{3}i}$ and $|w| = 1$, then z lies on - **[AIEEE - 2005]**

(A) an ellipse (B) a circle

(C) a straight line (D) a parabola

Q.11 The value of $\sum_{k=1}^{10}\left(\sin\frac{2k\pi}{11} + i\cos\frac{2k\pi}{11}\right)$ is – **[AIEEE - 2006]**

(A) 1 (B) -1

(C) $-i$ (D) i

Q.12 If $|z + 4| \leq 3$, then the maximum and minimum value of $|z + 1|$ are - **[AIEEE - 2007]**

(A) 4, 1 (B) 4, 0

(C) 6, 1 (D) 6, 0

Q.13 The conjugate of a complex number is $\frac{1}{i-1}$. Then that complex number is- **[AIEEE - 2008]**

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

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

Q.14 If ω is an imaginary cube root of unity then $(1 + \omega - \omega^2)(1 + \omega^2 - \omega)$ equals- **[AIEEE - 2002]**

(A) 0 (B) 1

(C) 2 (D) 4

Q.15 If the cube roots of unity are 1, ω, ω^2 then the roots of the equation $(x-1)^3 + 8 = 0$, are - **[AIEEE-2005]**

(A) $-1, -1+2\omega, -1-2\omega^2$
(B) $-1, -1, -1$
(C) $-1, 1-2\omega, 1-2\omega^2$
(D) $-1, 1+2\omega, 1+2\omega^2$

Q.16 If $z^2 + z + 1 = 0$, where z is a complex number, then the value of

$$\left(z+\frac{1}{z}\right)^2 + \left(z^2+\frac{1}{z^2}\right)^2 + \left(z^3+\frac{1}{z^3}\right)^2 + \ldots\ldots + \left(z^6+\frac{1}{z^6}\right)^2 \text{ is –}$$ **[AIEEE 2006]**

(A) 54 (B) 6
(C) 12 (D) 18

Q.17 Let **A** and **B** denote the statements
A : $\cos\alpha + \cos\beta + \cos\gamma = 0$
B : $\sin\alpha + \sin\beta + \sin\gamma = 0$

If $\cos(\beta-\gamma) + \cos(\gamma-\alpha) + \cos(\alpha-\beta) = -\frac{3}{2}$, then : **[AIEEE-2009]**

(A) A is false and B is true
(B) both A and B are true
(C) both A and B are false
(D) A is true and B is false

Q.18 If $\left|Z-\frac{4}{z}\right| = 2$, then the maximum value of $|Z|$ is equal to : **[AIEEE 2009]**

(A) $\sqrt{5}+1$ (B) 2
(C) $2+\sqrt{2}$ (D) $\sqrt{3}+1$

SECTION - B

Q.1 The equation not representing a circle is given by - **[IIT - 91]**

(A) $R_e\left(\frac{1+z}{1-z}\right) = 0$

(B) $z\bar{z} + iz - i\bar{z} + 1 = 0$

(C) $\arg\left(\frac{z-1}{z+1}\right) = \frac{\pi}{2}$

(D) $\left|\frac{z-1}{z+1}\right| = 1$

Q.2 If z is a complex number such that $z \neq 0$ and $R_e(z) = 0$, then - **[IIT - 92]**

(A) $R_e(z^2) = 0$ (B) $I_m(z^2) = 0$
(C) $R_e(z^2) = I_m(z^2)$ (D) none of these

Q.3 If α and β are different complex numbers with $|\beta| = 1$, then $\left|\frac{\beta-\alpha}{1-\bar{\alpha}\beta}\right|$ is equal to - **[IIT - 92]**

(A) 0 (B) 1/2
(C) 1 (D) 2

Q.4 The smallest positive integer n for which $(1+i)^{2n} = (1-i)^{2n}$ is - **[IIT - 93]**

(A) 4 (B) 8
(C) 2 (D) 12

Q.5 If α and β are two fixed non-zero complex numbers and 'z' a variable complex number. If the lines $\alpha\bar{z} + \bar{\alpha}z + 1 = 0$ and $\beta\bar{z} + \bar{\beta}z - 1 = 0$ are mutually perpendicular, then - **[IIT - 93]**

(A) $\alpha\beta + \bar{\alpha}\bar{\beta} = 0$

(B) $\alpha\beta - \bar{\alpha}\bar{\beta} = 0$

(C) $\bar{\alpha}\beta - \alpha\bar{\beta} = 0$

(D) $\alpha\bar{\beta} + \bar{\alpha}\beta = 0$

Q.6 If $z_1 = 8 + 4i$, $z_2 = 6 + 4i$ and $\arg\left(\frac{z-z_1}{z-z_2}\right) = \frac{\pi}{4}$, then z satisfies- **[IIT - 93]**

(A) $|z - 7 - 4i| = 1$ (B) $|z-7-5i| = \sqrt{2}$
(C) $|z - 4i| = 8$ (D) $|z-7i| = \sqrt{18}$

Q.7 if ω is an imaginary cube root of unity, then the value of $\sin\left[(\omega^{10}+\omega^{23})\pi - \frac{\pi}{4}\right]$ is- **[IIT - 94]**

(A) $-\frac{\sqrt{3}}{2}$ (B) $-\frac{1}{\sqrt{2}}$
(C) $\frac{1}{\sqrt{2}}$ (D) $-\frac{\sqrt{3}}{2}$

Q.8 If z_1, z_2, z_3 are vertices of an equilateral triangle inscribed in the circle | z | = 2 and If $z_1 = 1 + i\sqrt{3}$, then - **[IIT - 94,99]**

(A) $z_2 = -2$, $z_3 = 1 - i\sqrt{3}$

(B) $z_2 = 2$, $z_3 = 1 - i\sqrt{3}$

(C) $z_2 = -2$, $z_3 = -1 - i\sqrt{3}$

(D) $z_2 = -1 - i\sqrt{3}$, $z_3 = -1 - i\sqrt{3}$

Q.9 If ω ($\neq 1$) is a cube root of unity and $(1 + \omega)^7 = A + B\omega$, then A & B are respectively the numbers **[IIT - 95]**

(A) 0, 1

(B) 1,1

(C) 1, 0

(D) – 1, 1

Q.10 If ($\omega \neq 1$) is a cube root of unity then $\begin{vmatrix} 1 & 1+i+\omega^2 & \omega^2 \\ 1-i & -1 & \omega^2-1 \\ -i & -i+\omega-1 & -1 \end{vmatrix}$ = **[IIT - 95]**

(A) 0 (B) 1

(C) i (D) ω

Q.11 $\begin{vmatrix} 6i & -3i & 1 \\ 4 & 3i & -1 \\ 20 & 3 & i \end{vmatrix}$ = x + i y , then- **[IIT - 98]**

(A) x = 3 , y = 1

(B) x = 1 , y = 3

(C) x = 0 , y = 3

(D) x = 0 , y = 0

Q.12 If ω is an imaginary cube root of unity , then $(1 + \omega - \omega^2)^7$ equals **[IIT - 98]**

(A) 128 ω (B) – 128 ω

(C) 128 ω^2 (D) – 128 ω^2

Q.13 The value of the sum $\sum_{n=1}^{13} (i^n + i^{n+1})$, where $i = \sqrt{-1}$, equals **[IIT- 98]**

(A) i (B) i – 1

(C) – i (D) 0

Q.14 If $i = \sqrt{-1}$, then $4 + 5\left(-\frac{1}{2}+\frac{i\sqrt{3}}{2}\right)^{334} + 3\left(-\frac{1}{2}+\frac{i\sqrt{3}}{2}\right)^{365}$ is equal to- **[IIT - 99]**

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

(C) $i\sqrt{3}$ (D) $-i\sqrt{3}$

Q.15 If z_1, z_2, z_3 are complex numbers such that $|z_1| = |z_2| = |z_3| = \left|\frac{1}{z_1}+\frac{1}{z_2}+\frac{1}{z_3}\right| = 1$, then $|z_1 + z_2 + z_3|$ is - **[IIT - 2000]**

(A) equal to 1

(B) less than 1

(C) greater than 3

(D) equal to 3

Q.16 If arg (z) < 0 , then arg (–z) – arg (z) = **[IIT - 2000]**

(A) π (B) $-\pi$

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

Q.17 The complex numbers z_1,z_2 and z_3 satisfying $\frac{z_1 - z_3}{z_2 - z_3} = \frac{1 - i\sqrt{3}}{2}$ are the vertices of a triangles which is **[IIT - 2001]**

(A) of area zero

(B) right angled isosceles

(C) equilateral

(D) obtuse angled isosceles

Q.18 If z_1 and z_2 be the nth roots of unity which subtend right angle at the origin. Then n must be of the form **[IIT - 2001]**

(A) 4 k + 1 (B) 4k + 2

(C) 4k + 3 (D) 4k

Q.19 For all complex numbers z_1, z_2 satisfying $|z_1| = 12$ and $|z_2 - 3 - 4i| = 5$, the minimum value of $|z_1 - z_2|$ is - **[IIT - 2002]**

(A) 0 (B) 2

(C) 7 (D) 17

Q.20 Let $\omega = -1/2 + i\sqrt{3}/2$. Then the value of the determinant $\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1-\omega^2 & \omega^2 \\ 1 & \omega^2 & \omega^4 \end{vmatrix}$ is - **[IIT - 2002]**

(A) 3ω
(B) $3\omega(\omega - 1)$
(C) $3\omega^2$
(D) $3\omega(1 - \omega)$

Q.21 If $|z| = 1$, $z \neq -1$ and $w = \frac{z-1}{z+1}$ then real part of w = ? **[IIT - Sc-2003]**

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

Q.22 If ω is cube root of unity ($\omega \neq 1$) then the least value of n, where n is positive integer such that $(1 + \omega^2)^n = (1 + \omega^4)^n$ is - **[IIT - Sc-2004]**

(A) 2 (B) 3
(C) 5 (D) 6

Q.23 A man walks a distance of 3 units from the origin towards the north-east (N 45° E) direction. From there, he walks a distance of 4 units towards the north-west (N 45° W) direction to reach a point P. Then the position of P in the Argand plane is- **[IIT - 2007]**

(A) $3e^{i\pi/4} + 4i$ (B) $(3 - 4i)\ e^{i\pi/4}$
(C) $(4 + 3i)\ e^{i\pi/4}$ (D) $(3 + 4i)\ e^{i\pi/4}$

Q.24 If $|z| = 1$ and $z \neq \pm 1$, then all the values of $\frac{z}{1-z^2}$ lie on- **[IIT - 2007]**

(A) a line not passing through the origin
(B) $|z| = \sqrt{2}$
(C) the x–axis
(D) the y–axis

Q.25 Let $z = \cos\theta + i \sin\theta$. Then the value of $\sum_{m=1}^{15} \text{Im}(Z^{2m-1})$ at $\theta = 2°$ is **[IIT - 2009]**

(A) $\frac{1}{\sin 2°}$ (B) $\frac{1}{3\sin 2°}$
(C) $\frac{1}{2\sin 2°}$ (D) $\frac{1}{4\sin 2°}$

Q.26 Let $z = x + iy$ be a complex number where x and y are integers. Then the area of the rectangle whose vertices are the roots of the equation $z\bar{z}^3 + \bar{z}z^3 = 350$ **[IIT - 2009]**

(A) 48 (B) 32
(C) 40 (D) 80

ANSWER KEY

WORKSHEET DAY 5

Q.No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	A	A	D	B	D	D	C	B	A	C	C	B	A	B	B	D	B	B	B	B
Q.No.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
Ans.	D	D	B	B	D	A	A	A	A	D	A	D	A	A	B	B	A	A	B	D
Q.No.	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
Ans.	D	B	D	C	B	A	D	D	D	B	A	C	B	C	B	C	B	D	B	B
Q.No.	**61**	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**	**71**	**72**	**73**	**74**	**75**	**76**	**77**	**78**	**79**	**80**
Ans.	B	C	B	B	B	D	A	B	B	B	C	B	B	A	A	C	C	B	D	A
Q.No.	**81**	**82**	**83**	**84**	**85**	**86**	**87**	**88**	**89**	**90**	**91**	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**	**100**
Ans.	D	C	A	B	A	D	D	A	B	C	C	C	C	C	D	A	C	A	A	B
Q.No.	**101**	**102**																		
Ans.	C	C																		

WORKSHEET DAY 6

SECTION - A

Q.No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Ans.	D	A	A	D	B	C	D	B	C	C	C	C	B	D	C	C	B	A

SECTION - B

Q.No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	D	B	C	C	D	B	C	A	B	A	D	D	B	C	A	A	C	D	B	B
Q.No.	**21**	**22**	**23**	**24**	**25**	**26**														
Ans.	D	B	D	D	D	A														