

Answer Ex-I**SINGLE CORRECT (OBJECTIVE QUESTIONS)**

1. A	2. C	3. B	4. D	5. D	6. A	7. A
8. A	9. A	10. A	11. C	12. C	13. C	14. C
15. C	16. B	17. D	18. B	19. D	20. A	21. D
22. D	23. B	24. A	25. D	26. C	27. A	28. C
29. C	30. A	31. C	32. A	33. A	34. C	35. B
36. B	37. B	38. A	39. C	40. C	41. B	42. B
43. B	44. C	45. B	46. C	47. D	48. A	49. C
50. C	51. C	52. C	53. C	54. A	55. B	56. B
57. A	58. C	59. A	60. A	61. D	62. A	63. D
64. D	65. C	66. A	67. D	68. D	69. C	70. A
71. D	72. D	73. A				

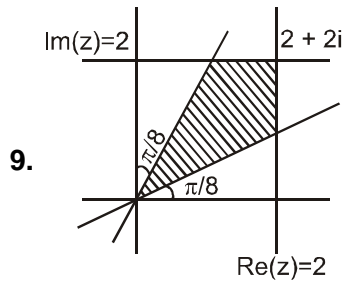
Answer Ex-II**MULTIPLE CORRECT (OBJECTIVE QUESTIONS)**

1. BCD	2. ABC	3. ACD	4. AB	5. ABCD	6. BC	7. ABC
8. BD	9. AD	10. ACD				

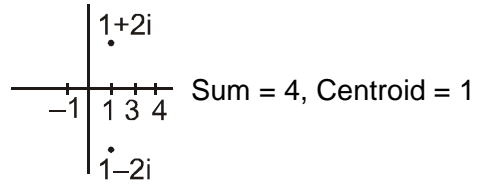
Answer Ex-III**SUBJECTIVE QUESTIONS**

1. 3, -1 2. (i) $\pm (4 + 3i)$ (ii) $\pm \frac{1}{\sqrt{2}} (3 + i)$
3. (a) $|z| = 2 \cos \frac{9\pi}{25}$; Principal Arg $z = \frac{9\pi}{25}$; $\arg z = \frac{9\pi}{25} + 2k\pi, k \in \mathbb{I}$
- (b) Modulus = 2; Arg = $2k\pi - \frac{5\pi}{6}$ m $k \in \mathbb{I}$; Principal Arg = $-\frac{5\pi}{6}$
4. (a) The region between the concentric circles with centre at (0, 2) & radii 1 and 3 units
- (b) The part of the complex plane on or above the line $y = 1$
- (c) a ray emanating from the point $(3 + 4i)$ directed away from the origin & having equation,
- $$\sqrt{3}x - y - 3\sqrt{3} = 0, x > 3$$

5. $\sqrt{5} + 2$ & $\sqrt{5} - 2$ 6. (i) 0, 6 (ii) 1, 7 (iii) 0, 5 7. (i) $|z| = 20$ (ii) $OP = OQ = PR = QR = 20$



11. $z = -1, 3, 1 - 2i, 1 + 2i$



12. (i) -1 (ii) $e^{\frac{(6n+1)\pi i}{4}}$, $n = 0, 1, 2, 3$. Continued product = 1 13. 5 15. $\left(-\frac{21}{10}, -\frac{5}{6}\right)$

16. $3\omega^2$ 17. $-\frac{3}{2} + \frac{3\sqrt{3}}{2}i$ 18. (a) $z_1 = \frac{A+B+C}{3}$, $z_2 = \frac{A+B\omega^2+C\omega}{3}$, $z_3 = \frac{A+B\omega+C\omega^2}{3}$

20. (a) $\frac{7}{25} + \frac{24}{25}i$; (b) $\frac{21}{5} - \frac{12}{5}i$; (c) $3 + 4i$; (d) $-\frac{8}{29} + 0i$; (e) $\frac{22}{5}i$

21. (a) $x = 1, y = 2$; (b) $(2, 9)$; (c) $(-2, 2)$ or $\left(-\frac{2}{3}, -\frac{2}{3}\right)$; (d) $(1, 1)$ or $\left(0, \frac{5}{2}\right)$; (e) $x = K, y = \frac{3K}{2}$, $K \in \mathbb{R}$

23. $a = b = 2 - \sqrt{3}$ 24. (a) $\frac{\sqrt{3}}{2} - \frac{i}{2}, -\frac{\sqrt{3}}{2} - \frac{i}{2}, i$; 25. $\frac{x^2}{64} + \frac{y^2}{48} = 1$ 26. (c) 64

27. (a) on a circle of radius $\sqrt{7}$ with centre $(-1, 2)$; (b) on a unit circle with centre at origin
(c) on a circle with centre $(-15/4, 0)$ & radius $9/4$; (d) a straight line

28. (i) Modulus = 6, Arg = $2k\pi + \frac{5\pi}{18}$ ($K \in \mathbb{I}$), Principal Arg = $\frac{5\pi}{18}$ ($K \in \mathbb{I}$)

(ii) Modulus = 2, Arg = $2k\pi + \frac{7\pi}{6}$, Principal Arg = $-\frac{5\pi}{6}$.

(iii) Modulus = $\frac{\sqrt{5}}{6}$, Arg = $2k\pi - \tan^{-1} 2$ ($K \in \mathbb{I}$), Principal Arg = $-\tan^{-1} 2$

Answer Ex-IV**ADVANCED SUBJECTIVE QUESTIONS**

2. (a) (1, 1); (b) $\left[\frac{n(n+1)}{2}\right]^2 - n$ 3. (a) 2; (b) $-11/2$
4. (i) Principal Arg $z = -\frac{4\pi}{9}$; $|z| = 2 \cos \frac{4\pi}{9}$; Arg $z = 2k\pi - \frac{4\pi}{9}$ $k \in \mathbb{I}$.
 (ii) Modulus = $\sec^2 1$, Arg = $2n\pi + (2 - \pi)$, Principal Arg = $(2 - \pi)$
 (iii) Principal value of Arg $z = -\frac{\pi}{2}$ & $|z| = \frac{3}{2}$; Principal value of Arg $z = \frac{\pi}{2}$ & $|z| = \frac{2}{3}$.
 (iv) Modulus = $\frac{1}{\sqrt{2}} \operatorname{cosec} \frac{\pi}{5}$, Arg $z = 2n\pi + \frac{11\pi}{20}$, Principal Arg = $\frac{11\pi}{20}$
7. (a) region outside or on the circle with centre $\frac{1}{2} + 2i$ and radius $\frac{1}{2}$.
 (b) semi circle (in the 1st & 4th quadrant) $x^2 + y^2 = 1$
9. $(1 - c^2) |z|^2 - 2(a + bc) (\operatorname{Re} z) + a^2 - b^2 = 0$ 10. (a) $K = 3$; (b) -4
11. one if n is even; $-w^2$ if n is odd 13. (a) $\pi - 2$; (b) $1/2$ 14. -19
18. (a) $-\frac{7}{2}$; (b) zero 19. $\frac{iz}{2} + \frac{1}{2} + i$ 20. 198 21. 51
22. $|f(z)|$ is maximum when $z = \omega$, where ω is the cube root unity and $|f(z)| = \sqrt{13}$
24. required set is constituted by the angles without their boundaries, whose sides are the straight lines $y = (\sqrt{2} - 1)x$ and $y + (\sqrt{2} + 1)x = 0$ containing the x -axis.

Answer Ex-V**JEE PROBLEMS**

1. (a) C 2. (i) $7A_0 + 7A_7x^7 + 7A_{14}x^{14}$; (ii) $x^3 + qx - r = 0$ 3. (a) A; (b) A
4. $z^2 + z + \frac{\sin^2 n\theta}{\sin^2 \theta} = 0$, where $\theta = \frac{2\pi}{2n+1}$ 5. $\pm 1 + i\sqrt{3}$, $\frac{(\pm\sqrt{3}+i)}{\sqrt{2}}$, $\sqrt{2}i$ 6. (a) C, (b) D
7. (a) B; (b) B 9. (a) D; (b) Centre $\equiv \frac{k^2\beta - \alpha}{k^2 - 1}$, Radius $= \frac{1}{(k^2 - 1)} \sqrt{|\alpha - k^2\beta|^2 - (k^2|\beta|^2 - |\alpha|^2)(k^2 - 1)}$
10. (a) A; (b) B, (c) $z_2 = -\sqrt{3}i$; $z_3 = (1 - \sqrt{3}) + i$; $z_4 = (1 + \sqrt{3}) - i$ 11. D
12. (a) D; (b) D 13. (a) D; (b) (i) B; (ii) C; (iii) D 14. A
15. D 16. B 17. C 18. A, C, D 19. 0001
20. (A) $\rightarrow Q, R$; (B) $\rightarrow P$; (C) $\rightarrow P, S, T$; (D) $\rightarrow P, Q, R, S$