DPP - Daily Practice Problems

Chapter-wise Sheets

Date : ________ **Start Time :** ________ **End Time :** ________

MATHEMATICS CM05

SYLLABUS : Complex Numbers And Quadratic Equations

Max. Marks : 120 **Marking Scheme :** (+4) for correct & (–1) for incorrect answer **Time : 60 min.**

INSTRUCTIONS : This Daily Practice Problem Sheet contains 30 MCQs. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page.

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

(a) 1 (b) 2

(c) 3 (d) 4

2. If α and β be the roots of $x^2 + px + q = 0$, then $\dfrac{(\omega\alpha + \omega^2\beta)(\omega^2\alpha + \omega\beta)}{\dfrac{\alpha^2}{\beta} + \dfrac{\beta^2}{\alpha}}$ is equal to (ω, ω^2 are complex cube roots of unity)

(a) $-\dfrac{q}{p}$ (b) $\alpha\beta$

(c) $-\dfrac{p}{q}$ (d) ω

3. If α, β be the roots of the equation $x^2 - px + q = 0$, then the equation whose roots are

$\alpha^2\left(\dfrac{\alpha^2}{\beta} - \beta\right)$ and $\beta^2\left(\dfrac{\beta^2}{\alpha} - \alpha\right)$ is

(a) $qx^2 - p(p^2 - q)(p^2 - 4q)x - p^2q^2(p^2 - 4q) = 0$

(b) $px^2 - q(p^2 - p)(p^2 - 4q)x + p^2q^2(p^2 - 4q) = 0$

(c) $px^2 - qx + p = 0$

(d) None of these

RESPONSE GRID	1. ⓐⓑⓒⓓ	2. ⓐⓑⓒⓓ	3. ⓐⓑⓒⓓ

Space for Rough Work

4. If α and β be the values of x in $m^2(x^2 - x) + 2mx + 3 = 0$ and m_1 and m_2 be two values of m for which α and β are connected by the relation $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} = \frac{4}{3}$. Then the value of $\frac{m_1^2}{m_2} + \frac{m_2^2}{m_1}$ is

(a) 6 (b) 68

(c) $\frac{3}{68}$ (d) $-\frac{68}{3}$

5. If $z_1 = \sqrt{3} + i\sqrt{3}$ and $z_2 = \sqrt{3} + i$, then in which quadrant $\left(\frac{z_1}{z_2}\right)$ lies?

(a) I (b) II

(c) III (d) IV

6. The root of the equation $2(1+i)x^2 - 4(2-i)x - 5 - 3i = 0$ which has greater modulus is

(a) $\frac{3-5i}{2}$ (b) $\frac{5-3i}{2}$

(c) $\frac{3-i}{2}$ (d) None of these

7. Value of $\frac{(\cos\theta + i\sin\theta)^4}{(\cos\theta - i\sin\theta)^3}$ is

(a) $\cos 5\theta + i\sin 5\theta$ (b) $\cos 7\theta + i\sin 7\theta$

(c) $\cos 4\theta + i\sin 4\theta$ (d) $\cos\theta + i\sin\theta$

8. Number of solutions of the equation, $z^3 + \frac{3|z|^2}{z} = 0$, where z is a complex number and $|z| = \sqrt{3}$ is

(a) 2 (b) 3

(c) 6 (d) 4

9. If $z = x + iy$ is a variable complex number such that $\arg\frac{z-1}{z+1} = \frac{\pi}{4}$ then :

(a) $x^2 - y^2 - 2x = 1$ (b) $x^2 + y^2 - 2x = 1$

(c) $x^2 + y^2 - 2y = 1$ (d) $x^2 + y^2 + 2x = 1$

10. Let $a > 0$, $b > 0$ and $c > 0$. Then both the roots of the equation $ax^2 + bx + c = 0$

(a) are real and negative

(b) have negative real parts

(c) are rational numbers

(d) None of these

11. Let z lies on the circle centred at the origin. If area of the triangle whose vertices are z, ωz and $z+\omega z$, where ω is the cube root of unity is $4\sqrt{3}$ sq. unit. Then radius of the circle is :

(a) 1 unit (b) 2 units

(c) 4 units (d) None of these

12. For a complex number z, the minimum value of $|z| + |z-2|$ is

(a) 1 (b) 2

(c) 3 (d) None of these

13. The complex number z satisfying the equations $|z| - 4 = |z - i| = |z + 5i| = 0$, is

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

(c) $-2\sqrt{3} + 2i$ (d) 0

14. If α, β, γ and a, b, c are complex numbers such that $\frac{\alpha}{a} + \frac{\beta}{b} + \frac{\gamma}{c} = 1 + i$ and $\frac{a}{\alpha} + \frac{b}{\beta} + \frac{c}{\gamma} = 0$, then the value of $\frac{\alpha^2}{a^2} + \frac{\beta^2}{b^2} + \frac{\gamma^2}{c^2}$ is equal to

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

(c) 0 (d) +1

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	9. ⓐⓑⓒⓓ	10. ⓐⓑⓒⓓ	11. ⓐⓑⓒⓓ	12. ⓐⓑⓒⓓ	13. ⓐⓑⓒⓓ
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Space for Rough Work

15. If $\left(7-4\sqrt{3}\right)^{x^2-4x+3}+\left(7+4\sqrt{3}\right)^{x^2-4x+3}=14$, then the value of x is given by

(a) $2, 2\pm\sqrt{2}$ (b) $2\pm\sqrt{3}, 3$

(c) $3\pm\sqrt{2}, 2$ (d) None of these

16. If α, β be the roots of $ax^2+bx+c=0$ and γ, δ those of $lx^2+mx+n=0$, then the equation whose roots are $\alpha\gamma+\beta\delta$ and $\alpha\delta+\beta\gamma$ is

(a) $a^2l^2x^2-ablmx+b^2l\text{n}+acm^2-4acl\text{n}=0$

(b) $alx^2-ablmx+(a+b-c)(l+m-n)=0$

(c) $a^2l^2x^2+(a^2+b^2)(l^2+m^2)x-(a+b-c)(l+m-n)=0$

(d) None of these

17. $\left(\frac{-1+\sqrt{-3}}{2}\right)^{100}+\left(\frac{-1-\sqrt{-3}}{2}\right)^{100}$ is equal to

(a) 2 (b) zero

(c) -1 (d) 1

18. If x is real, the maximum value of $\frac{3x^2+9x+17}{3x^2+9x+7}$ is

(a) $\frac{1}{4}$ (b) 41

(c) 1 (d) $\frac{17}{7}$

19. $\left(\frac{1}{1-2i}+\frac{3}{1+i}\right)\left(\frac{3+4i}{2-4i}\right)$ is equal to :

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

20. If p, q, r are non-zero real numbers, the two equation, $2a^2x^2-2abx+b^2=0$ and $p^2x^2+3pqx+q^2=0$ have :

(a) no common root

(b) one common root if $2a^2+b^2=p^2+q^2$

(c) two common roots if $3pq=2ab$

(d) two common roots if $3qb=2\,ap$

21. The centre of a regular hexagon is at the point z = i. If one of its vertices is at 2 + i, then the adjacent vertices of 2 + i are at the points

(a) $1\pm 2i$ (b) $i+1\pm\sqrt{3}$

(c) $2+i(1\pm\sqrt{3})$ (d) $1+i(1\pm\sqrt{3})$

22. If a, b, c are real numbers $a\neq 0$. If α, is a root of $a^2x^2+bx+c=0$, β is a root of $a^2x^2-bx-c=0$ and $0<\alpha<\beta$, then the equation $a^2x^2+2bx+2c=0$ has a γ root that always satisfies:

(a) $\gamma=\frac{\alpha+\beta}{2}$ (b) $\gamma=\frac{\alpha-\beta}{2}$

(c) $\gamma=\alpha$ (d) $\alpha<\gamma<\beta$

23. If the roots of the equation $(x-a)(x-b)+(x-b)(x-c)+(x-c)(x-a)=0$ are equal, then $a^2+b^2+c^2=$

(a) $a+b+c$ (b) $2a+b+c$

(c) $3abc$ (d) $ab+bc+ca$

24. If $|a+ib|=1$, then the simplified form of $\frac{1+b+ai}{1+b-ai}$ is

(a) $b+ai$ (b) $a+bi$

(c) $(1+b)^2+a^2$ (d) ai

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	20. ⓐⓑⓒⓓ	21. ⓐⓑⓒⓓ	22. ⓐⓑⓒⓓ	23. ⓐⓑⓒⓓ	24. ⓐⓑⓒⓓ

Space for Rough Work

25. Let a, b, c, p, q be real numbers. Suppose α, β are the roots of the equation $x^2 + 2px + q = 0$ and $\alpha, \frac{1}{\beta}$ are the roots of the equation $x^2 + 2bx + c = 0$, where $\beta^2 \notin (-1, 0, 1)$

Statement-1: $(p^2 - q)(b^2 - ac) \geq 0$

Statement-2: $b \neq pa$ or $c \neq qa$

(a) Statement -1 is true, Statement-2 is true; Statement -2 is a correct explanation for Statement-1

(b) Statement -1 is true, Statement-2 is true; Statement -2 is NOT a correct explanation for Statement-1

(c) Statement -1 is false, Statement-2 is true

(d) Statement -1 is true, Statement-2 is false

26. If ω is a non-real cube root of unity, then

$\frac{1+2\omega+3\omega^2}{2+3\omega+\omega^2} + \frac{2+3\omega+3\omega^2}{3+3\omega+2\omega^2}$ is equal to

(a) -2ω (b) 2ω

(c) ω (d) 0

27. If α, β are the roots of the equation $ax^2 + bx + c = 0$ such that $\beta < \alpha < 0$, then the quadratic equation whose roots are $|\alpha|, |\beta|$, is given by

(a) $|a|x^2 + |b|x + |c| = 0$ (b) $ax^2 - |b|x + c = 0$

(c) $|a|x^2 - |b|x + |c| = 0$ (d) $a|x|^2 + b|x| + |c| = 0$

28. If $z = 2 + i$, then $(z-1)(\bar{z}-5) + (\bar{z}-1)(z-5)$ is equal to

(a) 2 (b) 7

(c) –1 (d) –4

29. If α, β are the roots of the equation $2x^2 + 6x + b = 0$, $(b < 0)$ then $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$ is less than :

(a) 1 (b) –1

(c) 2 (d) –2

30. A + iB form of $\frac{(\cos x + i\sin x)(\cos y + i\sin y)}{(\cot u + i)(1 + i\tan v)}$ is equal to :

(a) $\sin u \cos v\,[\cos(x+y-u-v) + i\sin(x+y-u-v)]$

(b) $\sin u \cos v\,[\cos(x+y+u+v) + i\sin(x+y+u+v)]$

(c) $\sin u \cos v\,[\cos(x+y+u+v) - i\sin(x+y-u+v)]$

(d) None of these

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	25. ⓐⓑⓒⓓ 26. ⓐⓑⓒⓓ 27. ⓐⓑⓒⓓ 28. ⓐⓑⓒⓓ 29. ⓐⓑⓒⓓ 30. ⓐⓑⓒⓓ

DAILY PRACTICE PROBLEM DPP CHAPTERWISE 5 - MATHEMATICS			
Total Questions	30	Total Marks	120
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	37	Qualifying Score	55
Success Gap = Net Score – Qualifying Score			
Net Score = (Correct × 4) – (Incorrect × 1)			

Space for Rough Work