GGSRDN

Educational Services Private Limited

9th, 10th, NEET, JEE(Main/Advanced)

अभ्यास ही सबसे बड़ा गुरु है।

CLASS : XI (MATHEMATICS)

DPP

DAILY PRACTICE PROBLEM

DPP-31 to 40

MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 31

Total Marks : 27

Max. Time : 28 min.

Topics : Trigonometric Ratio & Identities, Sequence & Series

Type of Questions		M.M., Min.
Single choice Objective (no negative marking) Q.1,2,3,4,5	(3 marks, 3 min.)	[15, 15]
Subjective Questions (no negative marking) Q.6	(4 marks, 5 min.)	[4, 5]
Match the Following (no negative marking) Q.7	(8 marks, 8 min.)	[8, 8]

1. The value of $\cos^2 73^\circ + \cos^2 47^\circ - \sin^2 43^\circ + \sin^2 107^\circ$ is equal to :

(A) 1 (B) $\frac{1}{2}$ (C) $\frac{\sqrt{3}}{2}$ (D) none of these

2. The expression $4\cos^4 x - 2\cos 2x - \frac{1}{2}\cos 4x$ when simplified reduces to :

(A) 2/3 (B) 3/2 (C) – 2/3 (D) – 3/2

3. If $x \in R$, the numbers $2^{1+x} + 2^{1-x}$, $\frac{b}{2}$, $36^x + 36^{-x}$ form an A.P., then b must lie in the interval

(A) $[12, \infty)$ (B) $[6, \infty)$ (C) $(-\infty, 6]$ (D) [6, 12]

4. If $f(r) = 1 + \frac{1}{2} + \frac{1}{3} + ... \frac{1}{r}$ and f(0) = 0, then $\sum_{r=1}^{n} (2r+1) f(r)$

(A) $(n + 1) f(n + 1) - \frac{(n^2+3n+2)}{2}$ (B) $n f(n + 1) - \frac{(n^2+3n+2)}{2}$

(C) $(n + 1)^2 f(n + 1) - \frac{(n^2+3n+2)}{2}$ (D) $(n + 1)^2 f(n) - \frac{(n^2+3n+2)}{2}$

5. Value of $\cos^4\frac{\pi}{8} + \cos^4\frac{3\pi}{8} + \cos^4\frac{5\pi}{8} + \cos^4\frac{7\pi}{8}$ is

(A) $\frac{1}{2}$ (B) $\frac{3}{2}$ (C) 1 (D) 0

6. Suppose α, β, γ and δ are the interior angles of pentagon, hexagon, decoagon and dodecogon respectively, find the values of $|\cos\alpha + \sec\beta + \cos\gamma + \text{cosec}\,\delta|$.
Assume that all polygons are regular.

7. **Match the column**

Column – I	**Column – II**
(A) If $x = \sin\theta|\sin\theta|$ and $y = \cos\theta|\cos\theta|$ and $\frac{99\pi}{2} < \theta < 50\pi$, then y – x is equal to	(p) –1
(B) If $\frac{\cos(\alpha-\beta)}{\cos(\alpha+\beta)} + \frac{\cos(\gamma+\delta)}{\cos(\gamma-\delta)} = 0$, then $(\tan\alpha.\tan\beta.\tan\gamma.\tan\delta)$ has the value equal to	(q) 0
(C) If A lies in the third quadrant and 3 tanA – 4 = 0, then 5 sin 2A + 3 sin A + 4 cos A is equal to	(r) 1
(D) If $\sum_{i=1}^{n}\cos\theta_i = n$, then $\sum_{i=1}^{n}\sin\theta_i$ is equal to	(s) 2

MATHEMATICS

DPP
DAILY PRACTICE PROBLEMS

DPP No. 32

Total Marks : 22

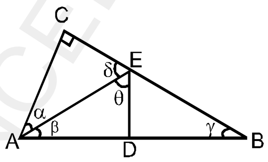
Max. Time : 23 min.

Topic : Trigonometric Ratio & Identities

Type of Questions		M.M., Min.
Comprehension (no negative marking) Q.1 to Q.3	(3 marks, 3 min.)	[9, 9]
Single choice Objective (no negative marking) Q.4,5,6	(3 marks, 3 min.)	[9, 9]
Subjective Questions (no negative marking) Q.5	(4 marks, 5 min.)	[4, 5]

COMPREHENSION (Q.No. 1 to 3) :

In the figure below, it is given that $\angle C = 90°$, AD = DB, ED is perpendicular to AB, AB = 20 units and AC = 12 units.



1. Area of triangle AEC is

(A) 24 sq. units (B) 21 sq. units (C) 42 sq. units (D) $\frac{21}{2}$ sq. units

2. The value of $\tan(\delta + \beta)$, is

(A) $-\frac{117}{44}$ (B) $\frac{17}{4}$ (C) $\frac{3}{4}$ (D) $\frac{5}{4}$

3. The value of $\cos(\alpha + \beta)$, is

(A) $\frac{4}{5}$ (B) $\frac{3}{5}$ (C) $\frac{117}{125}$ (D) $-\frac{44}{125}$

4. If $(1 + \tan 1^o) . (1 + \tan 2^o) . (1 + \tan 3^o) ....(1 + \tan 45^o) = 2^n$, then 'n' is equal to

(A) 16 (B) 23 (C) 30 (D) none of these

5. The most general solution of $\tan\theta = -1$ and $\cos\theta = \frac{1}{\sqrt{2}}$ is :

(A) $n\pi + \frac{7\pi}{4}, n \in I$ (B) $n\pi + (-1)^n \frac{7\pi}{4}, n \in I$ (C) $2n\pi + \frac{7\pi}{4}, n \in I$ (D) none of these

6. If $\cos^2 \frac{\pi}{8}$ is a root of the equation $x^2 + bx + c = 0$, where $b, c \in Q$, then the ordered pair (b, c) is:

(A) $\left(1, \frac{1}{8}\right)$ (B) $\left(-1, \frac{1}{8}\right)$ (C) $\left(1, -\frac{1}{8}\right)$ (D) $\left(-1, -\frac{1}{8}\right)$

7. Find the greatest & the least values of the expression $(x \in R)$ $\frac{1}{\sin^6 x + \cos^6 x}$.

MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 33

Total Marks : 23

Max. Time : 24 min.

Topics : Trigonometric Ratio & Identities, Sequence & Series

Type of Questions		M.M.,	Min.
Single choice Objective (no negative marking) Q.1,2,3,4,5	(3 marks, 3 min.)	[15,	15]
Fill in the Blanks (no negative marking) Q.6	(4 marks, 4 min.)	[4,	4]
Subjective Questions (no negative marking) Q.7	(4 marks, 5 min.)	[4,	5]

1. If $4^{\sin 2x + 2\cos^2 x} + 4^{1 - \sin 2x + 2\sin^2 x} = 65$, then (sin 2x + cos 2x) has the value equal to :

(A) –1 (B) 2 (C) $\sqrt{2}$ (D) 1

2. If $P = \cos\frac{\pi}{20} \cdot \cos\frac{3\pi}{20} \cdot \cos\frac{7\pi}{20} \cdot \cos\frac{9\pi}{20}$ &

$Q = \cos\frac{\pi}{11} \cdot \cos\frac{2\pi}{11} \cdot \cos\frac{4\pi}{11} \cdot \cos\frac{8\pi}{11} \cdot \cos\frac{16\pi}{11}$, then $\frac{P}{Q}$ is :

(A) not defined (B) 1 (C) 2 (D) none of these

3. A triangle ABC is such that $\sin(2A + B) = \frac{1}{2}$. If A, B, C are in A.P. then the angle A, B, C are respectively.

(A) $\frac{5\pi}{12}, \frac{\pi}{4}, \frac{\pi}{3}$ (B) $\frac{\pi}{4}, \frac{\pi}{3}, \frac{5\pi}{12}$ (C) $\frac{\pi}{3}, \frac{\pi}{4}, \frac{5\pi}{12}$ (D) $\frac{\pi}{3}, \frac{5\pi}{12}, \frac{\pi}{4}$

4. The solution set of the equation $4\sin\theta.\cos\theta - 2\cos\theta - 2\sqrt{3}\sin\theta + \sqrt{3} = 0$ in the interval $(0, 2\pi)$ is

(A) $\left\{\frac{3\pi}{4}, \frac{7\pi}{4}\right\}$ (B) $\left\{\frac{\pi}{3}, \frac{5\pi}{3}\right\}$ (C) $\left\{\frac{3\pi}{4}, \pi, \frac{\pi}{3}, \frac{5\pi}{3}\right\}$ (D) $\left\{\frac{\pi}{6}, \frac{5\pi}{6}, \frac{11\pi}{6}\right\}$

5. First, second and seventh terms of an A.P. (all the terms are distinct), whose sum is 93, are in G.P. Fourth term of this G.P. is

(A) 21 (B) 31 (C) 75 (D) 375

6. Exact value of tan 200° (cot 10° – tan 10°) is _______ .

7. Find the value of $\sin^4\frac{\pi}{16} + \sin^4\frac{3\pi}{16} + \sin^4\frac{5\pi}{16} + \sin^4\frac{7\pi}{16}$

MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 34

Total Marks : 26

Max. Time : 25 min.

Topics : Trigonometric Ratio & Identities, Sequence & Series

Type of Questions		M.M., Min.
Single choice Objective (no negative marking) Q.1,2,3,4	(3 marks, 3 min.)	[12, 12]
Multiple choice objective (no negative marking) Q.5,6	(5 marks, 4 min.)	[10, 8]
Subjective Questions (no negative marking) Q.7	(4 marks, 5 min.)	[4, 5]

1. If $\sin\theta + \cos\theta = \frac{1}{5}$ and $0 < \theta < \pi$, then $\tan\theta$ is

(A) $-\frac{4}{3}$ (B) $-\frac{3}{4}$ (C) $\frac{3}{4}$ (D) $\frac{4}{3}$

2. If $A + B + C = 0$, then the value of
$\sin^2 A + \cos C(\cos A \cos B - \cos C) + \cos B(\cos A \cos C - \cos B)$ is equal to :

(A) -1 (B) 0 (C) 1 (D) none of these

3. If the roots of the equation $x^3 - px^2 - r = 0$ are $\tan\alpha$, $\tan\beta$, $\tan\gamma$, then the value of $\sec^2\alpha \cdot \sec^2\beta \cdot \sec^2\gamma$ is

(A) $(p + r)^2 + 1$ (B) $(p - r)^2 + 1$ (C) $p^2 - r^2 - 2pr + 1$ (D) $(p - r)^2 - 1$

4. If the sum of first three terms of a G.P. is to the sum of first six terms as 125 : 152, then the common ratio of the G.P. is

(A) $\frac{3}{5}$ (B) $\frac{5}{3}$ (C) $\frac{2}{5}$ (D) $\frac{5}{2}$

5. If $\sin\theta + \sin\phi = a$ and $\cos\theta + \cos\phi = b$, then

(A) $\cos\left(\frac{\theta-\phi}{2}\right) = \pm\frac{1}{2}\sqrt{a^2+b^2}$

(B) $\cos\left(\frac{\theta-\phi}{2}\right) = \pm\sqrt{a^2-b^2}$

(C) $\tan\left(\frac{\theta-\phi}{2}\right) = \pm\sqrt{\frac{4-a^2-b^2}{a^2+b^2}}$

(D) $\cos(\theta-\phi) = \frac{a^2+b^2-2}{2}$

6. If $\sin(x - y) = \cos(x + y) = 1/2$ then the values of x & y lying between 0 and π are given by:

(A) $x = \pi/4,\ y = 3\pi/4$ (B) $x = \pi/4,\ y = \pi/12$
(C) $x = 5\pi/4,\ y = 5\pi/12$ (D) $x = 11\pi/12,\ y = 3\pi/4$

7. What are the most general values of θ which satisfy the equations,

(a) $\sin\theta = \frac{1}{\sqrt{2}}$ (b) $\tan(x - 1) = \sqrt{3}$ (c) $\tan\theta = -1$

(d) $\text{cosec}\,\theta = \frac{2}{\sqrt{3}}$. (e) $2\cot^2\theta = \text{cosec}^2\theta$

MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 35

Total Marks : 27

Max. Time : 27 min.

Topic : Logarithm

Type of Questions		**M.M., Min.**
Single choice Objective (no negative marking) Q.1,2,3	**(3 marks, 3 min.)**	**[9, 9]**
Multiple choice objective (no negative marking) Q.4,5	**(5 marks, 4 min.)**	**[10, 8]**
Subjective Questions (no negative marking) Q.6,7	**(4 marks, 5 min.)**	**[8, 10]**

1. If $\log_7 \log_2 \log_\pi x$ vanishes, then x equals:

(A) π^2 (B) 4 (C) 49 (D) none

2. If $\log_3 x = a$ and $\log_7 x = b$, then which of the following is equal to $\log_{21} x$?

(A) ab (B) $\dfrac{ab}{a^{-1}+b^{-1}}$ (C) $\dfrac{1}{a+b}$ (D) $\dfrac{1}{a^{-1}+b^{-1}}$

3. Let $N = \dfrac{81^{\frac{1}{\log_5 9}} + 3^{\frac{3}{\log_{\sqrt{6}} 3}}}{409} \cdot \left((\sqrt{7})^{\frac{2}{\log_{25} 7}} - 125^{\log_{25} 6} \right)$, then value of $\log_2 N$ is equal to :

(A) 0 (B) 1 (C) –1 (D) none

4. If $\ell n (x + z) + ln (x - 2y + z) = 2\, ln (x - z)$, then :

(A) $y = \dfrac{2xz}{x+z}$ (B) $y^2 = xz$ (C) $2y = x + z$ (D) $\dfrac{x}{z} = \dfrac{x-y}{y-z}$

5. Which of the following when simplified reduces to unity ?

(A) $\log_{1.5} \log_4 \log_{\sqrt{3}} 81$

(B) $\log_2 \sqrt{6} + \log_2 \sqrt{\dfrac{2}{3}}$

(C) $-\dfrac{1}{6} \log_{\frac{\sqrt{3}}{2}} \left(\dfrac{64}{27}\right)$

(D) $\log_{3.5}(1 + 2 + 3 \div 6)$

6. If $\log_{\sqrt{8}} b = 3\dfrac{1}{3}$, then b is equal to ......

7. Which is greater

(i) $\log_{\frac{1}{3}} \dfrac{1}{80}$ or $\log_{\frac{1}{2}} \left(\dfrac{1}{15+\sqrt{2}}\right)$ (ii) $\log_3 5$ or $\log_{17} 25$ (iii) $\log_{\frac{1}{5}} \dfrac{1}{7}$ or $\log_{\frac{1}{7}} \dfrac{1}{5}$

MATHEMATICS

DPP — DAILY PRACTICE PROBLEMS

DPP No. 36

Total Marks : 45

Max. Time : 54 min.

Topic : Logarithm

Type of Questions		M.M., Min.
Subjective Questions (no negative marking) Q.1, 2, 3, 4, 5, 6, 7, 8, 9	(4 marks, 5 min.)	[36, 45]
Single choice Objective (no negative marking) Q.10, 11, 12	(3 marks, 3 min.)	[9, 9]

1. Find logarithm of the following values :

(i) 0.128 (ii) 0.0125 (iii) 36.12 (iv) 0.0002432

(v) 5 (vi) 500 (vii) 0.01361 (viii) $[\pi] + \bar{2}.927$

(ix) $\log\left(2+\frac{1}{5}(\bar{4}.265)\right)$

2. Find antilog of the following values :

(i) $\bar{2}.362$ (ii) -3.7913 (iii) 2.6329 (iv) 0.0125

3. (i) Find antilog of 0.4 to the base 32. (ii) Find antilog of 2 to the base $\sqrt{3}$.

(iii) Find number whose logarithm is 1.6078.

4. Find the value of $\sqrt[5]{0.00000165}$ rounded upto five places of decimal.

5. Given $\log_{10}2 = 0.3010$, find $\log_{25} 200$ by using log table

6. Find volume of a cuboid whose edges are 58.73 cm, 2.631 cm and 0.3798 cm using log table.

7. Find the value of $(23.17)^{\frac{1}{5.76}}$ using log table.

8. Find the value of $\text{antilog}_{\sqrt{3}} \sqrt{5}$ using log table.

9. Find number of digits in 875^{16}

10. Number of integers whose characteristic of logarithms to the base 10 is 3, is

(A) 8999 (B) 9000 (C) 90000 (D) 99000

11. If mantissa of lagarithm of 719.3 to the base 10 is 0.8569, then mantissa of logarithm of 71.93 is

(A) 0.8569 (B) $\bar{1}.8569$ (C) 1.8569 (D) 0.1431

12. Number of digits in integral part of $60^{12} + 60^{-12} - 60^{-15}$ is (given log 2 = 0.3030, log 3 = 0.4771)

(A) 20 (B) 21 (C) 22 (D) 24

MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 37

Total Marks : 30

Max. Time : 33 min.

Topics : Fundamentals of Mathematics, Logarithm

Type of Questions		M.M.,	Min.
Single choice Objective (no negative marking) Q.1	(3 marks, 3 min.)	[3,	3]
Assertion and Reason (no negative marking) Q.2	(3 marks, 3 min.)	[3,	3]
Subjective Questions (no negative marking) Q.3,5,6	(4 marks, 5 min.)	[12,	15]
Fill in the Blanks (no negative marking) Q.4	(4 marks, 4 min.)	[4,	4]
Match the Following (no negative marking) Q.7	(8 marks, 8 min.)	[8,	8]

1. The complete solution set of the inequation $\sqrt{x+18} < 2 - x$, is

(A) [–18, –2) (B) [–18, –5) (C) (–18, 5) (D) none of these

2. Statement-1 : $\log_{10}x < \log_{\pi}x < \log_e x < \log_2 x \quad (x > 0 \text{ and } x \neq 1)$

Statement-2 : If $0 < x < 1$, then $\log_x a > \log_x b \Rightarrow a < b$.

(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 True, Statement-2 is False.

(D) Statement-1 is False, Statement-2 is True.

3. If $\log_6 \log_2\left[\sqrt{4x+2} + 2\sqrt{x}\right] = 0$, then x = ______.

4. Given, $\log_a x = \alpha$; $\log_b x = \beta$; $\log_c x = \gamma$ & $\log_d x = \delta$ $(x \neq 1)$, then $\log_{abcd} x$ has the value equal to ______

5. Solve the equation for x : $\log 4 + \left(1+\frac{1}{2x}\right)\log 3 = \log\left(\sqrt[x]{3} + 27\right)$

6. Find all integral solutions of the equation $4\log_{x/2}(\sqrt{x}) + 2\log_{4x}(x^2) = 3\log_{2x}(x^3)$

7. **Match the following**

Column – I	**Column – II**
(A) If $\log_4(x+1) + \log_4(x+8) = \frac{3}{2}$, then value(s) of x is (are)	(p) 1
(B) If $\lvert x\rvert + \lvert x-5\rvert = 6$ and $x < 0$, then $\left(x+\frac{3}{2}\right)$ is equal to	(q) 4
(C) The value of $4\left(3\log_2\frac{81}{80} + 5\log_2\frac{25}{24} + 7\log_2\frac{16}{15}\right)$ is	(r) 0
(D) The remainder when $2x^5 - x^3 + x^2 + 1$ is divided by $(2x+1)$ is k. Then $\frac{16k+11}{16}$ is equal to	(s) 2

MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 38

Total Marks : 24

Max. Time : 23 min.

Topics : Fundamentals of Mathematics, Logarithm

Type of Questions		**M.M., Min.**
Single choice Objective (no negative marking) Q.1,2,3	**(3 marks, 3 min.)**	**[9, 9]**
Multiple choice objective (no negative marking) Q.4	**(5 marks, 4 min.)**	**[5, 4]**
True or False (no negative marking) Q.5	**(2 marks, 2 min.)**	**[2, 2]**
Fill in the Blanks (no negative marking) Q.6,7	**(4 marks, 4 min.)**	**[8, 8]**

1. The expression E = $81^{\log_{0.\bar{3}}\left(\frac{1}{\sqrt{4+2\sqrt{3}}-\sqrt{4-2\sqrt{3}}}\right)}$ is simplified to.

(A) 16 (B) 4 (C) 2 (D) $\frac{1}{2}$

2. The complete solution set of $x - \sqrt{1-|x|} < 0$ is

(A) $\left[-1, \frac{-1+\sqrt{5}}{2}\right)$ (B) [–1, 1] (C) $\left(-1, \frac{-1+\sqrt{5}}{2}\right)$ (D) $\left(\frac{-1+\sqrt{5}}{2}, \frac{1+\sqrt{5}}{2}\right)$

3. If $\sqrt{1-x} > \sqrt{1+x}$, then the complete solution set of x is

(A) $(-\infty, 0)$ (B) [–1, 1] (C) (0, 1] (D) [–1, 0)

4. For the equation $\log_{3\sqrt{x}} x + \log_{3x}\sqrt{x} = 0$, which of the following do not hold good?

(A) no real solution (B) one prime solution

(C) one integral solution (D) no irrational solution

5. State whether the following statements are **True** or **False.**

(i) If $\log_a x = \log_b y$, then each is equal to $\log_{ab} xy$.

(ii) The value of x satisfying the equation $\log_3 x + \log_9 x + \log_{27} x = 11$ is a perfect square as well as a perfect cube

6. The value of 'x' satisfying the equation, $4^{\log_9 3} + 9^{\log_2 4} = 10^{\log_x 83}$ is ________ .

7. Real x satisfying the equation $9^{\log_3(\log_2 x)} = \log_2 x - (\log_2 x)^2 + 1$ is ______.

MATHEMATICS

DPP
DAILY PRACTICE PROBLEMS

DPP No. 39

Total Marks : 27

Max. Time : 27 min.

Topics : Fundamentals of Mathematics, Complex Numbers, Logarithm

Type of Questions		M.M., Min.
Comprehension (no negative marking) Q.1 to Q.3	(3 marks, 3 min.)	[9, 9]
Multiple choice objective (no negative marking) Q.4,5	(5 marks, 4 min.)	[10, 8]
Subjective Questions (no negative marking) Q.6,7	(4 marks, 5 min.)	[8, 10]

COMPREHENSION (Q.No. 1 to 3) :

Set of all the solutions of the inequality $\sqrt{x^2-6x+5} \geq x-4$ is $(-\infty, p] \cup [q, \infty)$.

Set of all the solutions of the inequality $\left(\frac{1}{3}\right)^{x^2-6x-7} > 1$ is (a, b), where p, q, a, b $\in$ R.

[.] respresents greatest integer function.

1. [p + q] is equal to
(A) 6 (B) 7 (C) 8 (D) 5

2. Number of integers which are common to both solution sets is
(A) 2 (B) 3 (C) 4 (D) None of these

3. If k denotes the number of divisors of 3 (p + 2q + a + b) then set of all the solutions of [x] = k is -
(A) [4, 5) (B) [6, 7) (C) [7, 8) (D) [8, 9)

4. If $z = \sqrt{20i-21} + \sqrt{21+20i}$, then the principle value of arg z can be :

(A) $\frac{\pi}{4}$ (B) $\frac{3\pi}{4}$ (C) $-\frac{\pi}{4}$ (D) $-\frac{3\pi}{4}$

5. $(1+i)^{n_1} + (1+i^3)^{n_1} + (1-i^5)^{n_2} + (1-i^7)^{n_2}$ is a real number if (n_1, $n_2 \in$ Z)
(A) $n_1 = n_2 + 1$ (B) $n_1 + 1 = n_2$
(C) $n_1 = n_2$ (D) n_1, n_2 are any two positive integers

6. Find the square root of
(i) 5 + 12 i (ii) 27 – 36 i

7. Simplify : $\sqrt[3]{5^{\frac{1}{\log_7 5}} + \frac{1}{\sqrt{-\log_{10}(0.1)}}}$.

MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 40

Total Marks : 26

Max. Time : 24 min.

Topic : Complex Numbers

Type of Questions		M.M., Min.
Single choice Objective (no negative marking) Q.1,2,3,4	(3 marks, 3 min.)	[12, 12]
Multiple choice objective (no negative marking) Q.5,6	(5 marks, 4 min.)	[10, 8]
Fill in the Blanks (no negative marking) Q.7	(4 marks, 4 min.)	[4, 4]

1. The value of $\left|\sqrt{3-4i}\,.\,\sqrt{5+12i}\right|$ is

(A) 65 (B) $\sqrt{65}$ (C) $13\sqrt{5}$ (D) none of these

2. If z is a complex number such that |z| = 4 and arg(z) = $\frac{5\pi}{6}$, then z is equal to o

(A) $-2\sqrt{3}+2i$ (B) $2\sqrt{3}+i$ (C) $2\sqrt{3}-2i$ (D) $-\sqrt{3}+i$

3. If x + iy = $\frac{3}{\cos\theta+i\sin\theta+2}$, then $4x - x^2 - y^2$ is a real number equal to

(A) 2 (B) 1 (C) 4 (D) 3

4. The number $\left(1+\cos\frac{\pi}{3}+i\sin\frac{\pi}{3}\right)^6$ when simplified reduces to:

(A) 27 (B) –27 (C) 27(1 + i) (D) none

5. If $z^3 - iz^2 - 2iz - 2 = 0$, then z can be equal to :

(A) 1 – i (B) i (C) 1 + i (D) – 1 – i

6. If z = 1 + $\cos\frac{10\pi}{9}+i\sin\frac{10\pi}{9}$, then

(A) |z| = $2\cos\frac{5\pi}{9}$ (B) Arg(z) = $\frac{5\pi}{9}$ (C) |z| = $2\cos\frac{4\pi}{9}$ (D) Arg(z) = $-\frac{4\pi}{9}$

7. The solution set of the equation, $z^2 + (3 + 2i)z - 7 + 17i = 0$ where z is a complex number expressed in the form of a + bi is _______.

DPP 31 TO 41 (ANSWER KEY)

DPP NO. - 31

1. (A) **2.** (B) **3.** (B) **4.** (C) **5.** (B) **6.** $\frac{\sqrt{5}}{2}$

7. (A)→(r) (B)→(p) (C)→(q) (D)→(q)

DPP NO. - 32

1. (B) **2.** (A) **3.** (B) **4.** (B) **5.** (C) **6.** (B)

7. max. = 4 , min. = 1

DPP NO. - 33

1. (A) **2.** (C) **3.** (B) **4.** (D) **5.** (D) **6.** 2

7. $\frac{3}{2}$

DPP NO. - 34

1. (A) **2.** (B) **3.** (B) **4.** (A)

5. (A)(C)(D) **6.** (B)(D)

7. (a) $n\pi + (-1)^n \frac{\pi}{4}, n \in I$ (b) $n\pi + \frac{\pi}{3} + 1, n \in I$

(c) $n\pi - \frac{\pi}{4}, n \in I$ (d) $n\pi + (-1)^n \frac{\pi}{3}, n \in I$

(e) $n\pi \pm \frac{\pi}{4}, n \in I$

DPP NO. - 35

1. (A) **2.** (D) **3.** (A) **4.** (A)(D)

5. (A)(B)(C)(D) **6.** b = 32

7. (i) $\log_{\frac{1}{2}}\left(\frac{1}{15+\sqrt{2}}\right)$ (ii) $\log_3 5$ (iii) $\log_{\frac{1}{5}}\frac{1}{7}$

DPP NO. - 36

1. (i) $\bar{1}.1072$ (ii) $\bar{2}.0969$ (iii) 1.5577

(iv) $\bar{4}.3859$ (v) 0.6990 (vi) 2.6990

(vii) $\bar{2}.1372$ (viii) 0.2849 (ix) .0979

2. (i) 0.02301 (ii) 0.0001617 (iii) 429.4

(iv) 1.029

3. (i) 4 (ii) 3 (iii) 40.53

4. 0.06974 **5.** 1.642 **6.** 58.68 cm^3

7. 1.726 **8.** 3.415 **9.** 48 **10.** (B)

11. (A) **12.** (C)

DPP NO. - 37

1. (A) **2.** (D) **3.** $x = \frac{1}{16}$

4. $\frac{1}{\alpha^{-1} + \beta^{-1} + \gamma^{-1} + \delta^{-1}}$ **5.** $x \in f$

6. 1, 4 **7.** (A)→(r), (B)→(p), (C)→(q), (D)→(s)

DPP NO. - 38

1. (A) **2.** (A) **3.** (D) **4.** (A)(B)(D)

5. (i) True (ii) True **6.** 10 **7.** x = 2

DPP NO. - 39

1. (A) **2.** (B) **3.** (D) **4.** (A) (B)(C)(D)

5. (A)(B)(C)(D)

6. (i) 3 + 2i, –3 – 2i (ii) – 6 + 3i, 6 – 3i **7.** 2

DPP NO. - 40

1. (B) **2.** (A) **3.** (D) **4.** (B)

5. (B)(C)(D) **6.** (C)(D) **7.** 2 – 3i; – 5 + i

GGSRDN
Educational Services Private Limited
9th, 10th, NEET, JEE(Main/Advanced)
अभ्यास ही सबसे बड़ा गुरू है।

CLASS : XI (MATHEMATICS)

DPP

DAILY PRACTICE PROBLEM

Solutions

DPP-31 to 40

DPP 31 TO 41 (SOLUTIONS)

DPP NO. - 31

1. $\cos^2 73^\circ + \cos^2 47^\circ - \sin^2 43^\circ + \sin^2 107^\circ$
$= \cos^2(90-17) + \cos^2(90-43) - \sin^2 43) + \sin^2(90 + 17) = \sin^2 17 + \sin^2 43 - \sin^2 43 + \cos^2 17 = 1$

2. $(2\cos^2 x)^2 - 2\cos 2x - \frac{1}{2}\cos 4x$

$= (1+\cos 2x)^2 - 2\cos 2x - \frac{1}{2}(2\cos^2 2x - 1)$

$= 1 + \cos^2 2x + 2\cos 2x - 2\cos 2x - \cos^2 2x + \frac{1}{2}$

$= \frac{3}{2}$

3. $2.2^x + \frac{2}{2^x}, \frac{b}{2}, 36^x + 36^{-x} \rightarrow AP$

$b \ge 2\left[2^x + \frac{1}{2^x}\right] + \left[36^x + \frac{1}{36^x}\right]$

$b \ge 6$

4. $\sum_{r=1}^{n}(2r+1) = \sum_{r=1}^{n}\left[(r+1)^2 - r^2\right] f(r)$

$f(r+1) = 1 + \frac{1}{2} + \frac{1}{3} + \ldots\ldots + \frac{1}{r} + \frac{1}{r+1}$

$f(r) = 1 + \frac{1}{2} + \frac{1}{3} + \ldots.. + \frac{1}{r}$

$f(r+1) - f(r) = \frac{1}{r+1}$

$\sum_{r=1}^{n}(r+1)^2 f(r) - \sum_{r=1}^{n} r^2 f(r)$

$\sum_{r=1}^{n}(r+1)^2\left[f(r+1) - \frac{1}{r+1}\right] - \sum_{r=1}^{n} r^2 f(r)$

$\sum_{r=1}^{n}(r+1)^2 f(r+1) - \sum_{r=1}^{n} r^2 f(r) - \sum_{r=1}^{n}(r+1)$

$\sum_{r=1}^{n}\left[(r+1)^2 f(r+1) - r^2 f(r)\right] - \sum_{r=1}^{n} r - \sum_{r=1}^{n} 1$

$[2^2 f(2) - 1^2 f(1)] - \frac{n(n+1)}{2} - n$

$[3^2 f(3) - 2^2 f(2)]$

: :

: :

$[(n+1)^2 f(n+1) - n^2 f(x)]$

$[(n+1)^2 f(n+1) - 1^2 f(1)] - \frac{n^2 - 3n}{2}$

$(n+1)^2 f(n+1) - \frac{(n^2 + 3n + 2)}{2}$

5. $\cos^2\theta = \frac{\cos 2\theta + 1}{2}$

$\cos^4\frac{\pi}{8} + \cos^4\frac{3\pi}{8} + \cos^4\frac{5\pi}{8} + \cos^4\frac{7\pi}{8} = 2\cos^4\frac{\pi}{8} + 2\cos^4\frac{3\pi}{8}$

$= 2\left(\cos^4\frac{\pi}{8} + \sin^4\frac{\pi}{8}\right)$

$= 2\left[\left(\cos^2\frac{\pi}{8} + \sin^2\frac{\pi}{8}\right)^2 - 2\sin^2\frac{\pi}{8}\cos^2\frac{\pi}{8}\right]$

$= 2\left[1 - \frac{1}{2}\sin^2\frac{\pi}{4}\right] = 2\left[1 - \frac{1}{2}\times\frac{1}{2}\right] = \frac{3}{2}$

6. $\alpha = 180^\circ$, $\beta = 120^\circ$, $\gamma = 144^\circ$, $\delta = 150^\circ$
$|\cos 108^\circ + \sec 120^\circ + \cos 144^\circ + \text{cosec } 150^\circ|$

$= \frac{\sqrt{5}}{2}$

7. (A) $X = \sin\theta\,|\sin\theta|$
$Y = \cos\theta\,|\cos\theta|$

$\frac{99\pi}{2} < \theta < 50\pi$

θ lies in 4th quadrant
$X = -\sin^2\theta$
$Y = \cos^2\theta$
$Y - x = \cos^2\theta + \sin^2\theta = 1$

(B) $\frac{\cos(\alpha-\beta)}{\cos(\alpha+\beta)} + \frac{\cos(\gamma+\delta)}{\cos(\gamma-\delta)}$

$= \frac{\cos(\alpha-\beta)\cos(\gamma-\delta) + \cos(\gamma+\delta)\cos(\alpha+\beta)}{\cos(\alpha+\beta)\cos(\gamma-\delta)}$

DPP NO. - 32

1. AD = DB
$\angle ADE = \angle BDE$
ED = ED (Common to both circles)
hence both Δ's are concurrent
hence AE = BE
$B = \gamma$
AC = 12, AB = 20, BC = 16

$\tan\gamma = \frac{AC}{BC} = \frac{12}{16} = \frac{3}{4}$

$\alpha + \beta = 90 - \gamma$
$\alpha + \gamma = 90 - \gamma$
$\alpha = 90 - 2\gamma$

$\tan\alpha = \frac{CE}{AC}$

$CE = AC\tan(90 - 2\gamma)$

$\tan\alpha = \frac{CE}{AC}$

$CE = AC\tan(30 - 2\gamma) = 12 \times \frac{(1-\tan^2\gamma)}{2\tan\gamma} = 12 \times$

$$\frac{\left(1-\frac{9}{16}\right)}{2\times\frac{3}{4}} = 8 \times \frac{7}{16} = \frac{7}{2}$$

Area $\frac{1}{2}$ × AC × CE = $\frac{1}{2}$ × 12 × $\frac{7}{2}$ = 21

2. $\delta = \gamma + \beta$

$\delta + \beta = 3\gamma$

$$\tan(3\gamma) = \frac{3\tan\gamma - \tan^3\gamma}{1-3\tan^2\gamma} = -\frac{117}{44}$$

3. $\cos(\alpha + \beta) = \frac{AC}{AB} = \frac{12}{20} = \frac{3}{5}$

4. L.H.S.

(1 + tan 1º) (1 + tan 44º) (1 + tan2º) (1 + tan 43º) ....(1 + tan 45º)

= (1 + tan 1º + tan 44º + tan 1º tan 44º) + (1 + tan 2º + tan 43º + tan 2º tan 43º) ..... (1 + tan 45º)

= (1 + 1) (1 + 1) .... (1 + 1) 23 times = 2^{23}

n = 23

5. $\tan\theta = -1 \Rightarrow \theta = \frac{3\pi}{4}, \frac{7\pi}{4}$ in $[0, 2\pi]$

$\cos\theta = \frac{1}{\sqrt{2}} \Rightarrow \theta = \frac{\pi}{4}, \frac{7\pi}{4}$ in $[0, 2\pi]$

∴ common value is $x = \frac{7\pi}{4}$

∴ general solution is $2n\pi + \frac{7\pi}{4}$, $n \in I$.

6. $x^2 + bx + c = 0$

$\cos^2\frac{\pi}{8}$ is the roots of equation

$$\cos^2\frac{\pi}{8} = \frac{\cos\frac{\pi}{4}+1}{2} = \frac{1}{2}\left(\frac{1}{\sqrt{2}}+1\right)$$

$$\left(\frac{1}{2}\left(\frac{1}{\sqrt{2}}+1\right)\right)^2 + b\,\frac{1}{2}\left(\frac{1}{\sqrt{2}}+1\right) + c = 0$$

$$\frac{1}{4}\left(\frac{1}{2}+1+\sqrt{2}\right) + b\,\frac{1}{2}\left(\frac{1}{\sqrt{2}}+1\right) + c = 0$$

$$\frac{1}{4}\left(\frac{1}{2}+1+\sqrt{2}\right) + \frac{b}{2\sqrt{2}} + b + c = 0$$

since b, c ∈ Q so compairing rational and irrational parts with zero we get

$$\frac{b}{2\sqrt{2}} + \frac{b}{2\sqrt{2}} = 0$$

b = – 1

$c = \frac{1}{8}$

7. $$\frac{1}{(\sin^2 x+\cos^2 x)^3 - 3\sin^2 x\cos^2 x(\sin^2 x+\cos^2 x)} =$$

$$\frac{1}{1-\frac{3}{4}(\sin 2x)^2}$$

$= \max. = \frac{1}{1-\frac{3}{4}(1)}$ min = $\frac{1}{1-\frac{3}{4}(0)}$

max = 4 min = 1

DPP NO. - 33

1. $4^{\sin 2x+2\cos^2 x} + 4^{1-\sin 2x+2\sin^2 x} = 65$

$4^{\sin2x+\cos2x+1} + 4^{1-\sin2x-\cos2x+1} = 65$

$4^{\sin2x+\cos2x+1} + 4^{3-(1+\sin 2x+\cos 2x)} = 65$

$4^{\sin2x+\cos2x+1} = y$

$y + \frac{64}{y} = 65$

$y^2 - 65y + 64 = 0$

y = 1, y = 64

$4^{\sin2x+\cos2x+1} = 4^0$ or $4^{\sin2x+\cos2x+1} = 4^3$

sin 2x + cos 2x = – 1

2. $P = \cos\frac{\pi}{20}\cos\frac{3\pi}{20}\cos\frac{7\pi}{20}\cos\frac{9\pi}{20}$

$P = \cos\frac{\pi}{20}\sin\frac{\pi}{20}\cos\frac{3\pi}{20}\sin\frac{3\pi}{20}$

$P = \frac{1}{4}\sin\frac{\pi}{10}\sin\frac{3\pi}{10} = \frac{1}{4}\,\frac{\sqrt{5}-1}{4} \times \frac{\sqrt{5}+1}{4}$

$= \frac{1}{16}$

$Q = \cos\frac{\pi}{11}\cos\frac{2\pi}{11}\cos\frac{4\pi}{11}\cos\frac{8\pi}{11}\cos\frac{16\pi}{11}$

$$Q = \frac{1}{2^5}\,\frac{\sin 2^5\frac{\pi}{11}}{\sin\frac{\pi}{11}} = \frac{1}{32}\,\frac{\sin\left(3\pi-\frac{\pi}{11}\right)}{\sin\frac{\pi}{11}} = \frac{1}{32}\,\frac{\sin\frac{\pi}{11}}{\sin\frac{\pi}{11}}$$

$$= \frac{1}{32} \Rightarrow \frac{P}{Q} = \frac{\frac{1}{16}}{\frac{1}{32}} = 2$$

3. $\sin(2A + B) = \frac{1}{2}$

⇒ 2A + B = 30º or 150º

A,B,C are in AP ⇒ B = 60º

∴ $2A = -30°$ or $90°$

⇒ $2A = 90°$ ⇒ $A = 45°$

∴ $C = 180° - A - B = 75°$

4. $4\sin\theta.\cos\theta - 2\cos\theta - 2\sqrt{3}\sin\theta + \sqrt{3} = 0$

⇒ $2\cos\theta(2\sin\theta - 1) - \sqrt{3}(2\sin\theta - 1) = 0$

⇒ $(2\sin\theta - 1)(2\cos\theta - \sqrt{3}) = 0$

⇒ $\sin\theta = \frac{1}{2}, = \frac{\sqrt{3}}{2}$ ⇒ $\theta = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{11\pi}{6}$

5. a, a+d , a + 6d

$(a + d)^2 = a(a + 6d)$

$d^2 + 2ad = 6ad$

$d^2 = 4ad$

$d = 4a$

$3a + 7d = 93$

$a = 3$

$d = 12$

3 , 15 , 75

$ar^3 \Rightarrow 3(5)^3 = 375$

6. $\tan 200° (\cot 10° - \tan 10°)$

$= \tan 20° \left(\frac{\cos 10}{\sin 10} - \frac{\sin 10}{\cos 10}\right)$

$= \tan 20 \left(\frac{\cos^2 10 - \sin^2 10}{\sin 10 . \cos 10}\right) = \tan 20 \frac{\cos 20 . 2}{\sin 20} = 2$

7. $\sin^4 \frac{\pi}{16} + \sin^4 \frac{3\pi}{16} + \sin^4 \frac{5\pi}{16} + \sin^4 \frac{7\pi}{16}$

⇒ $\sin^4 \frac{\pi}{16} + \sin^4 \frac{3\pi}{16} + \cos^4 \frac{3\pi}{16} + \cos^4 \frac{\pi}{16}$

⇒ $\left(\sin^2 \frac{\pi}{16} + \cos^2 \frac{\pi}{16}\right)^2 + \left(\sin^2 \frac{3\pi}{16} + \cos^2 \frac{3\pi}{16}\right)^2 - 2$

$\sin^2 \frac{\pi}{16} \cos^2 \frac{\pi}{16} - 2\sin^2 \frac{3\pi}{16} \cos^2 \frac{3\pi}{16}$

⇒ $2 - \frac{\sin^2 \frac{\pi}{8}}{2} - \frac{\sin^2 \frac{3\pi}{8}}{2}$

⇒ $2 - \frac{\left(1 - \cos\frac{\pi}{4}\right)}{4} - \frac{\left(1 - \cos\frac{3\pi}{4}\right)}{4}$

⇒ $\frac{3}{2} + \frac{\cos\frac{\pi}{4}}{4} + \frac{\cos\frac{3\pi}{4}}{4}$ ⇒ $\frac{3}{2}$

DPP NO. - 34

1. $\cos\theta + \sin\theta = \frac{1}{5}, \ 0 < \theta < \pi$

$\frac{1 - \tan^2\frac{\theta}{2}}{1 + \tan^2\frac{\theta}{2}} + \frac{2\tan\frac{\theta}{2}}{1 + \tan^2\frac{\theta}{2}} = \frac{1}{5}$

$5 - 5\tan^2\frac{\theta}{2} + 10\tan\frac{\theta}{2} = 1 + \tan^2\frac{\theta}{2}$

$6\tan^2\frac{\theta}{2} - 10\tan\frac{\theta}{2} - 4 = 0$

$6\tan^2\frac{\theta}{2} - 12\tan\frac{\theta}{2} + 2\tan\frac{\theta}{2} - 4 = 0$

$\tan\frac{\theta}{2} = 2, \tan\frac{\theta}{2} = -\frac{1}{3}$

$\theta \in (0, \pi)$

so $\frac{\theta}{2} \in \left(0, \frac{\pi}{2}\right)$

Hence $\tan\frac{\theta}{2} = -\frac{1}{3}$ is discarded

$\tan\frac{\theta}{2} = 2$

$\tan\theta = \frac{2\tan\theta}{1 - \tan^2\theta} = \frac{4}{1-4} = -\frac{4}{3}$

2. $A + B + C = 0$

$\sin^2 A + \cos C(\cos A \cos B - \cos C)$

$+ \cos B(\cos A \cos C - \cos B)$

$= \sin^2 A + \cos C(\cos A \cos B$

$- (\cos A \cos B - \sin A \sin B))$

$+ \cos B(\cos A \cos C - ((\cos A \cos C - \sin A \sin C))$

$= \sin^2 A + \sin A \sin(B + C) = \sin^2 A + \sin A \sin(-A) =$

$\sin^2 A - \sin^2 A = 0$

3. $x^3 - px^2 - r = 0$

$\tan\alpha + \tan\beta + \tan\gamma = p$

$\tan\alpha\tan\beta + \tan\beta\tan\gamma + \tan\gamma\tan\alpha = 0$

$\tan\alpha\tan\beta\tan\gamma = r$

$= \sec^2\alpha . \sec^2\beta \sec^2\gamma = (1 + \tan^2\alpha)(1 + \tan^2\beta)(1 + \tan^2\gamma)$

$= 1 + \tan^2\alpha + \tan^2\beta + \tan^2\gamma + (\tan\alpha\tan\beta)^2 + (\tan\beta\tan\gamma)^2 + (\tan\gamma\tan\alpha)^2 + (\tan\alpha\tan\beta\tan\gamma)^2$

$= 1 + p^2 + (-2rp) + r^2 = 1 + (p - r)^2$

4. $\frac{(1 - r^3)}{(1 - r^6)} = \frac{125}{152}$

$r^3 = t$

$\frac{1 - t}{1 - t^2} = \frac{125}{152}$

⇒ $152 - 152t = 125 - 125t^2$

⇒ $125t^2 - 152t + 27 = 0$

$t = \frac{27}{125}$

$r = t^{1/3}$

$= 3/5$

5. $\sin\theta + \sin\phi = a$ .....(i)

$\cos\theta + \cos\phi = a$ .....(ii)

squaring and adding

$\sin^2\theta + \sin^2\phi + 2\sin\theta\sin\theta = a^2$

$\cos^2\theta + \cos^2\phi + 2\cos\theta\cos\phi = b^2$

$2 + 2(\cos\theta\cos\phi + \sin\phi\sin\theta) = a^2 + b^2$

$$\cos(\theta - \phi) = \frac{a^2+b^2-2}{2}$$

$$2\cos^2\left(\frac{\theta-\phi}{2}\right) - 1 = \frac{a^2+b^2}{4} - 1$$

$$\cos^2\left(\frac{\theta-\phi}{2}\right) = \frac{a^2+b^2}{4}$$

$$\cos\left(\frac{\theta-\phi}{2}\right) = \pm\frac{1}{2}\sqrt{a^2+b^2}$$

6. $0 < x < \pi$

$0 < y < \pi$

$-\pi < -y < 0$

$-\pi < x - y < \pi$

$0 < x + y < 2\pi$

$$\sin(x - y) = \frac{1}{2}$$

$$x - y = \frac{\pi}{6} \quad \& \quad x - y = \frac{5\pi}{6}$$

$$x + y = \frac{\pi}{3} \quad \& \quad x + y = \frac{3\pi}{6}$$

$$x = \frac{\pi}{4} \qquad y = \frac{\pi}{12}$$

$$x = \frac{11\pi}{12} \qquad y = \frac{3\pi}{1}$$

7. (a) $\sin\theta = \dfrac{1}{\sqrt{2}}$

$\sin\theta = \sin\dfrac{\pi}{4}$

$\theta = n\pi + (-1)^n\dfrac{\pi}{4}$; $n \in I$

(b) $\tan(x - 1) = \tan\dfrac{\pi}{3}$

$x - 1 = n\pi + \dfrac{\pi}{3}$

$x = n\pi + \dfrac{\pi}{3} + 1$; $n \in I$

(c) $\tan\theta = \tan(-\pi/4)$

$\theta = n\pi - \pi/4$; $n \in I$

(d) $\sin\theta = \dfrac{\sqrt{3}}{2}$

$\sin\theta = \sin\dfrac{\pi}{3}$

$\theta = n\pi + (-1)^n\dfrac{\pi}{3}$; $n \in I$

(e) $\sin\theta \neq 0$

$2\cos^2\theta = 1$

$\cos^2\theta = \dfrac{1}{2}$

$\cos^2\theta = \cos^2\dfrac{\pi}{4}$

$\theta = n\pi \pm \dfrac{\pi}{4}$; $n \in I$

DPP NO. - 35

1. $\log_7\log_2\log_\pi x = 0$

$\log_2\log_\pi x = 1$

$\log_\pi x = 2 \Rightarrow x = \pi^2$

2. $\log_3 x = a$ & $\log_7 x = b$

$$\log_{21}x = \frac{1}{\log_x 21} = \frac{1}{\log_x 3 + \log_x 7} = \frac{1}{\frac{1}{a}+\frac{1}{b}}$$

3. $$N = \frac{81^{\frac{1}{\log_5 9}} + 3^{\frac{3}{\log_{\sqrt{6}} 3}}}{409} \cdot \left(\left(\sqrt{7}\right)^{\frac{2}{\log_{25} 7}} - 125^{\log_{25} 6}\right)$$

$$N = \frac{81^{\log_9 5} + 3^{3\log_3\sqrt{6}}}{409} \cdot \left(7^{\log_7 25} - 6^{\log_{25} 125}\right)$$

$$= \frac{25+6\sqrt{6}}{409}\left(25 - 6\sqrt{6}\right) = 1$$

$\log_2 N = \log_2 1 = 0$

4. $\ell n(x + z) + \ell n(x - 2y + z) = \ell n(x - z)^2$

$\Rightarrow (x + z)(x + z - 2y) = (x - z)^2$

$\Rightarrow x^2 + z^2 + 2xz - 2y(x + z) = x^2 + z^2 - 2xz$

$\Rightarrow y = \dfrac{2xz}{x+z}$ or $xy - xz = xz - yz$

$$\frac{x}{z} = \frac{x-y}{y-z}$$

5. (A) $\log_{1.5}\log_4\log_{\sqrt{3}}81 = \log_{1.5}\log_4 8$

$= \log_{1.5}1.5 = 1$

(B) $\log_2\sqrt{6} + \log_2\sqrt{\dfrac{2}{3}} = \log_2 2 = 1$

(C) $-\dfrac{1}{6}\log_{\frac{\sqrt{3}}{2}}\left(\dfrac{64}{27}\right) = \dfrac{1}{6}\log_{\frac{\sqrt{3}}{2}}\left(\dfrac{27}{64}\right) = \dfrac{1}{6} \cdot 6 = 1$

(D) $\log_{3.5}(1 + 2 + 3 \div 6) = \log_{3.5}3.5 = 1$

6. $\log_{\sqrt{8}} b = \dfrac{10}{3} \Rightarrow b = 2^5 = 32$

7. (i) $\log_3 80$ or $\log_2 15 + \sqrt{2}$

$\log_3 80 < 4$ and $\log_2 15 + \sqrt{2} > 4$

$\therefore \quad \log_{1/2}\left(\frac{1}{15+\sqrt{2}}\right) > \log_{1/3}\frac{1}{80}$

(ii) $\log_3 5$ or $\log_{17} 25$

$\log_3 5$ or $\log_{\sqrt{17}} 5$

$\log_3 5 > \log_{\sqrt{17}} 5$

(iii) $\log_{\frac{1}{5}}\frac{1}{7}$ or $\log_{\frac{1}{7}}\frac{1}{5}$

$\log_5 7$ or $\log_7 5$

$\log_5 7 > \log_7 5$

DPP NO. - 36

5. $x = \frac{\log_{10}^{200}}{\log_{10}^{25}} = \frac{\log_2+2}{2-\log 2} = 1.642$

9. $x = 875^{16}$

$\log_{10} x = 16 \log_{10}^{875} = 47.07$

$\Rightarrow$ number of digit 47 + 1 = 48.

10. $\log_{10} 1000 = 3$

$\log_{10} 10000 = 4$

Number between 1000 and 10000 including 1000 = 9000.

11. Mantissa remain the same all to questions.

12. $60^{-12} - 60^{-15}$ very small depend on 6012

$\log 60^{12} = 12 \log 60$.

DPP NO. - 37

1. $x \geq -18$ and $x < 2$ ....(1)

squaring both side

$\Rightarrow \quad x + 18 < 4 + x^2 - 18x$ ....(2)

(1) and (2)

$x \in [-18, -2)$.

2. Statement-1 : it is false for $0 < x < 1$

Statement-2 : it is true

As $0 < x < 1$, sign of inequality changes

3. $\log_6 \log_2 \left[\sqrt{4x+2} + 2\sqrt{x}\right] = 0$; $\quad x \geq 0$

$\Rightarrow \quad \log_2\left(\sqrt{4x+2} + 2\sqrt{x}\right) = 1$

$\Rightarrow \quad \sqrt{4x+2} + 2\sqrt{x} = 2 \Rightarrow \sqrt{4x+2} = 2\left(1-\sqrt{x}\right)$

squaring both sides $4x + 2 = 4(1 + x - 2\sqrt{x})$

$8\sqrt{x} = 2 \quad \Rightarrow \quad \sqrt{x} = \frac{1}{4} \quad \Rightarrow \quad x = \frac{1}{16}$

4. $\log_a x = \alpha$, $\log_b x = \beta$, $\log_c x = \gamma$, $\log_d x = \delta$

$\Rightarrow \quad a = x^{\frac{1}{\alpha}}$, $b = x^{\frac{1}{\beta}}$, $c = x^{\frac{1}{\gamma}}$, $d = x^{\frac{1}{\delta}}$

$\log_{abcd} x = \frac{1}{\frac{1}{\alpha}+\frac{1}{\beta}+\frac{1}{\gamma}+\frac{1}{\delta}}$

5. $\log 4 + \left(1+\frac{1}{2x}\right)\log 3 = \log\left(3^{\frac{1}{x}} + 27\right)$

$\log\left(4.3^{1+\frac{1}{2x}}\right) = \log\left(3^{\frac{1}{x}} + 27\right)$

$\Rightarrow \quad 12.3^{1/2x} = 3^{1/x} + 27$

Let $3^{1/2x} = t$ $\qquad \therefore \quad 12t = t^2 + 27$

$\Rightarrow \quad t^2 - 12t + 27 = 0 \qquad \Rightarrow \quad t = 3, 9$

$3^{1/2x} = 3 \quad \Rightarrow \quad \frac{1}{2x} = 1 \quad \Rightarrow \quad x = \frac{1}{2}$

$3^{1/2x} = 9 \quad \Rightarrow \quad \frac{1}{2x} = 2 \quad \Rightarrow \quad x = \frac{1}{4}$

but x has to a natural number (Since, $\sqrt[x]{3}$ is only defined, when x is natural number ≥ 2)

$\therefore \quad x \in \phi$

6. $4\log_{x/2}\sqrt{x} + 2\log_{4x} x^2 = 3\log_{2x} x^3$

$x > 0$, $x \neq \frac{1}{2}, \frac{1}{4}, 2$

$2\log_{x/2} x + 4\log_{4x} x = 9\log_{2x} x$

$\frac{2}{\log_x(x/2)} + \frac{4}{\log_x 4x} = \frac{9}{\log_x 2x}$

$\frac{2}{1-\log_x 2} + \frac{4}{\log_x 4+1} = \frac{9}{\log_x 2+1}$

let, $\log_x 2 = t$; $(x \neq 1)$

$\frac{2}{1-t} + \frac{4}{2t+1} = \frac{9}{t+1}$

$6(t + 1) = 9(t - 2t^2 + 1)$

$18t^2 - 3t - 3 = 0 \qquad \Rightarrow \quad 6t^2 - t - 1 = 0$

$\Rightarrow \quad t = \frac{1}{2}, -\frac{1}{3} \Rightarrow \quad x = 4, \frac{1}{8}$

Now, checking for x = 1

x = 1 satisfies the original equation

$\therefore$ integral solution are {1, 4}

7. (A) $\log_4(x + 1) + \log_4(x + 8) = \frac{3}{2}$

$x > -1$ and $\log_4(x + 1)(x + 8) = \frac{3}{2}$

$(x + 1)(x + 8) = 8$

$x^2 + 9x = 0$

$x = 0, -9$

but $x = -9$ is not possible

$\therefore \quad x = 0$

(B) $|x| + |x - 5| = 6$; $x < 0$

$-x + 5 - x = 6$

$2x = -1 \qquad \Rightarrow \quad x = -\frac{1}{2}$

so, $x + \frac{3}{2} = 1$

(C) $4\left(3\log_2\frac{81}{80} + 5\log_2\frac{25}{24} + 7\log_2\frac{16}{15}\right)$

$$\Rightarrow\ 4\left(\log_2 \frac{81^3 \,.\, 25^5 \,.\, 16^7}{24^5 \,.\, 80^3 \,.\, 15^7}\right) = 4\log_2 2 = 4$$

(D) $P(x) = 2x^5 - x^3 + x^2 + 1$

$$\text{Rem} = P\left(-\frac{1}{2}\right)$$

$$= -\frac{1}{16} + \frac{1}{8} + \frac{1}{4} + 1 = \frac{5}{4} + \frac{1}{16} = \frac{21}{10} = k$$

$$\therefore\ \frac{16k+11}{16} = \frac{21+11}{16} = \frac{32}{16} = 2$$

DPP NO. - 38

1. $E = 81^{\log_{0.\overline{3}}\left(\frac{1}{\sqrt{4+2\sqrt{3}}-\sqrt{4-2\sqrt{3}}}\right)}$

$$= 81^{\log_{\frac{1}{3}}\left(\frac{1}{\sqrt{3}+1-(\sqrt{3}-1)}\right)} = 81^{\log_{\frac{1}{3}}\frac{1}{2}} = 81^{\log_3 2} = 16$$

2. $x < \sqrt{1-|x|}$ Domain $1 - |x| \ge 0$ ...(1)

$x < 0$ always true ...(2)

$x \ge 0$ ...(3)

$x^2 < 1 - x$ ...(4)

$((1) \cap (2)) \cup ((3) \cap (4) \cap (1))$

3. $\sqrt{1-x} > \sqrt{1+x}$ $(-1 \le x \le 1)$

$1 - x > 1 + x$

$x < 0$

$\therefore\ x \in [-1, 0)$

4. $\frac{\log x}{\log 3\sqrt{a}} + \frac{\log\sqrt{x}}{\log 3x} = 0$

$$\frac{\log x}{\log 3 + \frac{1}{2}\log x} + \frac{1}{2}\,\frac{\log x}{(\log 3 + \log x)} = 0$$

$$\log x\left[\frac{2}{2\log 3 + \log x} + \frac{1}{2\log 3 + 2\log x}\right] = 0$$

$x > 0$ $\log x = 0$ or $4\log 3 + 3\log x$

$x = 1$ $= -2\log 3 - \log x$

One integral solution $5\log x = -6\log 3$

One irrational solution $x^5 = \frac{1}{3^{6/5}}$.

5. (i) $\log_a x = \log_b y$

$$\frac{\log x}{\log a} = \frac{\log y}{\log b} = M$$

$\log_{ab} xy = \lambda$ $\lambda = M$

$\frac{\log x + \log y}{\log a + \log b} = \lambda$ Hence true.

(ii) $\left(1 + \frac{1}{2} + \frac{1}{3}\right)\log_3 x = 11$

$\frac{11}{6}\log_3 x = 11$

$x = 3^6$

which is perfect square as well as perfect cube.

6. $2 + 81 = 10^{\log_x 83}$

$x = 10$ possible.

7. $2(\log_2 x)^2 = \log_2 x + 1$

$\log_2 x + t$

$2t^2 - t - 1 = 0$

$2t^2 - 2t + t - 1 = 0$

$2t(t-1) + 1(t-1) = 0$

$\log_2 x = 1$, $\log_2 x = \frac{-1}{2}$

$x = 2$

$x = \frac{1}{\sqrt{2}}$ but $x > 1$.

DPP NO. - 39

1. to 3. $\sqrt{x^2 - 6x + 5} \ge x - 4$ ... (i)

$\Rightarrow$ $x^2 - 6x + 5 \ge 0$ or $x \in (-\infty, 1] \cup [5, \infty)$

when $x \in (-\infty, 1]$ relation (i) is obviously true

For $x \ge 5$ $x^2 - 6x + 5 \ge x^2 + 16 - 8x$

or $x \ge 11/2$

$\Rightarrow$ solution of (i) is $x \in (-\infty, 1] \cup [\frac{11}{2}, \infty)$

$\Rightarrow$ $p = 1$ and $q = 11/2$

again $\left(\frac{1}{3}\right)^{x^2-6x-7} > 1$ $\Rightarrow$ $x^2 - 6x - 7 < 0$

or $x \in (-1, 7)$ $\Rightarrow$ $a = -1$, $b = 7$

1. $p + q = 1 + 5.5 = 6.5$

$[p + q] = 6$

2. Common of both sets in

$(-1, 1] \cup [11/2, 7)$

integers in this set are 0, 1, 6

3. $3(p + 2q + a + b) = 54$

$54 = 2^1\, 3^3$

hence number of divisors $= (1 + 1)(3 + 1) = 8$

$[x] = 8$ $\Rightarrow$ $x \in [8, 9)$

4. $z = i\sqrt{21-20i} + \sqrt{21+20i}$

$z = i\bar{z}_1 + z_1$ or $z = i z_1 + \bar{z}_1$

on finding square root

$x = iy = \sqrt{21+20i}$	$x + iy = \sqrt{21-20i}$
$x^2 - y^2 = 21$	$x^2 - y^2 = 21$
$xy = 10$	$xy = -10$
on solving	on solving
$x = \pm 5$	$x = \pm 5$
$y = \pm 2$	$y = \mp 2$

Principle arguments

$\frac{\pi}{4}, \frac{3\pi}{4}, \frac{-\pi}{4}, \frac{-3\pi}{4}$.

z = i (5 – 2i) + 5 + 2i = 7 + 7i
z = i (– 5 + 2i) + (– 5 – 2i) = – 7 – 7i
z = i(5 + 2i) + 5 – 2i = 3 + 3i
z = i(– 5 + 2i) – 5 – 2i = – 3 – 3i.

5. $(1+i)^{n_1} + (1+i^3)^{n_1} + (1-i^5)^{n_2} + (1-i^7)^{n_2}$

$= (1+i)^{n_1} + (1-i)^{n_1} + (1-i)^{n_2} + (1+i)^{n_2}$

$= \sqrt{2}\, e^{i\frac{\pi n_1}{4}} + \sqrt{2}\, e^{-i\frac{\pi n_1}{4}} + \sqrt{2}\, e^{-i\frac{\pi n_2}{4}} + \sqrt{2}\, e^{i\frac{\pi n_2}{4}}$

$= \sqrt{2}\,(e^{i\frac{\pi n_1}{4}} + e^{-i\frac{\pi n_1}{4}}) + \sqrt{2}\,(e^{-i\frac{\pi n_2}{4}} + \sqrt{2}\, e^{i\frac{\pi n_2}{4}})$

$= 2\sqrt{2}\cos\frac{\pi n_1}{4} + 2\sqrt{2}\cos\frac{\pi n_2}{4}$ = Real

$n_1, n_2, \in z$

6. (i) $\sqrt{5+12i}$ = a + ib,

squaring both sides

5 + 12 i = $(a + ib)^2 = a^2 - b^2 + 2iab$,

$a^2 - b^2 = 5$, ab = 6

solving a = ± 3, b = ± 2

(ii) $\sqrt{27-36i}$ = a + ib,

squaring both sides

27 – 36 i = $(a + ib)^2 = a^2 - b^2 + 2iab$,

$a^2 - b^2 = 27$, ab = –18

solving a = ± 6, b = ∓ 3

7. $\sqrt[3]{7+1} = 2$.

DPP NO. - 40

1. $\left|\sqrt{3-4i}\,.\,\sqrt{5+12i}\right| = \left|\sqrt{3-4i}\right|\left|\sqrt{5+12i}\right|$

$= \sqrt{5}\,\sqrt{13} = \sqrt{65}$

2. $z = 4\left[\cos\frac{5\pi}{6} + i\sin\frac{5\pi}{6}\right] \Rightarrow z = 4\left[-\frac{\sqrt{3}}{2} + i\frac{1}{2}\right)$

$z = -2\sqrt{3} + 2i$

3. $x + iy = \frac{3}{\cos\theta + i\sin\theta + 2}$ .... (i)

$x - iy = \frac{3}{2 + \cos\theta - i\sin\theta}$ .... (ii)

multiplying (i) & (ii)

$x^2 + y^2 = \frac{9}{5 + 4\cos\theta}$

Adding (1) & (2)

$x = \frac{3(2+\cos\theta)}{5+4\cos\theta}$

$4x - x^2 - y^2 = \frac{24 + 12\cos\theta - 9}{5 + 4\cos\theta}$

$4x - x^2 - y^2 = \frac{3(5+4\cos\theta)}{(5+4\cos\theta)}$

$4x - x^2 - y^2 = 3$

4. $\left(1 + \cos\frac{\pi}{3} + i\sin\frac{\pi}{3}\right)^6$

$= \left(2\cos^2\frac{\pi}{6} + 2i\sin\frac{\pi}{6}\cos\frac{\pi}{6}\right)^6$

$= 2^6\cos^6\pi/6\left(\cos\frac{\pi}{6} + i\sin\frac{\pi}{6}\right)^6 = 2^6\left(\frac{\sqrt{3}}{2}\right)^6(-1)$

$\Rightarrow -\left(\sqrt{3}\right)^6 = -27$

5. $z^3 - iz^2 - 2iz - 2 = 0$

$\Rightarrow z^2(z - i) - 2i(z - i) = 0$

$\Rightarrow (z^2 - 2i)(z - i) = 0$

$= z = i, \pm\sqrt{2i}$

$\Rightarrow z = i, \pm(1+i)$

6. $z = 1 + \frac{10\pi}{9} + i\sin\frac{10\pi}{9}$

$z = 2\cos^2\frac{5\pi}{9} + 2i\sin\frac{5\pi}{9}\cos\frac{5\pi}{9}$

$z = -2\cos\frac{4\pi}{9}\left[\cos\frac{5\pi}{9} + i\sin\frac{5\pi}{9}\right]$

$= 2\cos\frac{4\pi}{9}\left[-\cos\frac{5\pi}{9} - i\sin\frac{5\pi}{9}\right]$

$= 2\cos\frac{4\pi}{9}\left[\cos\left(\pi + \frac{5\pi}{9}\right) + i\sin\left(\pi + \frac{5\pi}{9}\right)\right]$

$\Rightarrow |z| = 2\cos\frac{4\pi}{9}$

7. $z^2 + (3 + 2i)z - 7 + 17i = 0$

$\Rightarrow (z - (2 - 3i))\ (z - (-5 + i)) = 0$

$\Rightarrow z = 2 - 3i \ \mid\ z = -5 + i$