PREFACE

This book contains the Daily Practice Problems (DPPs) designed for the aspirants JEE(Main+Advanced). It is a collection of problems (Physics, Chemistry & Mathematics in separate booklets) from multiple topics to understand the application of concepts learned in theory. Each DPP is kind of a timed test with marking scheme and prescribed time to be spent on each problem. It is according to the latest pattern of JEE(Advanced) and serves as a great tool for the students to simulate examination conditions at home. It enables a student to practice time management while solving a problem which helps him/her to better prepare for the target exam.

Every effort has been taken to keep this book error free, however any suggestions to improve are welcome at ***smdd@resonance.ac.in.***

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DPP
DAILY PRACTICE PROBLEMS

MATHEMATICS

TARGET: JEE (Main + Advanced) 2022

COURSE : VIKAAS (JA) **DPPs - B1 to B27**

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NOTE :

- ✍ **"Marked questions are recommended for Revision"**

DPP No. # B1(JEE–MAIN)

Total Marks : 46 **Max. Time : 45 min.**
Single choice Objective ('-1' negative marking) Q.1 ot Q.7 **(3 marks 3 min.) [21, 21]**
Multiple choice objective ('-2' negative & Partial marking) Q.8 **(4 marks 3 min.) [04, 03]**
Subjective Questions ('-1' negative marking) Q.9 to 15 **(3 marks 3 min.) [21, 21]**

Question No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Marks Obtained																

1. If product of the roots of the equation $3x^2 - 4x + (\log a^2 - \log(-a) + 3) = 0$ is 1, then 'a' is equal to
(1) not possible (2) – 1 (3) 1 (4) None of these

2. The product cot 123º . cot 133º . cot 137º . cot 147º , when simplified is equal to :
(1) – 1 (2) tan 37º (3) cot 33º (4) 1

3. $\cos(2001)\,\pi + \cot(2001)\,\frac{\pi}{2} + \sec(2001)\,\frac{\pi}{3} + \tan(2001)\,\frac{\pi}{4} + \operatorname{cosec}(2001)\,\frac{\pi}{6}$ equals to
(1) 0 (2) 1 (3) – 2 (4) Not defined

4. Let $\cos(\alpha + \beta) = \frac{4}{5}$ and let $\sin(\alpha - \beta) = \frac{5}{13}$, where $0 \le \alpha, \beta \le \frac{\pi}{4}$. Then $\tan 2\alpha =$
(1) $\frac{56}{33}$ (2) $\frac{19}{12}$ (3) $\frac{20}{7}$ (4) $\frac{25}{16}$

5. If the expression
$\cos\left(x - \frac{3\pi}{2}\right) + \sin\left(\frac{3\pi}{2} + x\right) + \sin(32\pi + x) - 18\cos(19\pi - x) + \cos(56\pi + x) - 9\sin(x + 17\pi)$
is expressed in the form of a sinx + b cosx, then (a + b) is equal to
(1) 17 (2) 27 (3) 13 (4) 23

6. The smallest value of $x^2 - 3x + 3$ in the interval $\left[-3, \frac{3}{2}\right]$ is
(1) – 20 (2) – 15 (3) 5 (4) 3/4

7. If $\cos 2x + 2\cos x = 1$, then $\sin^2 x\,(2 - \cos^2 x)$ is equal to
(1) 1 (2) 2 (3) 3 (4) 4

8. If $\sec A = \frac{17}{8}$ and $\operatorname{cosec} B = \frac{5}{4}$, then sec(A + B) can have the value equal to
(1) $\frac{85}{36}$ (2) $-\frac{85}{36}$ (3) $-\frac{85}{84}$ (4) $\frac{85}{84}$

9. Prove that $\frac{\sin A + \sin 3A + \sin 5A + \sin 7A}{\cos A + \cos 3A + \cos 5A + \cos 7A} = \tan 4A$

10. Prove that $2\cos\frac{\pi}{13}\cos\frac{9\pi}{13} + \cos\frac{3\pi}{13} + \cos\frac{5\pi}{13} = 0$

11. If θ lies in III quadrant and $\sin\theta = -\frac{12}{13}$, find $\cos\theta$, $\tan\theta$, $\cot\theta$

12. Prove that : $\frac{1 - \sin\theta}{1 + \sin\theta} = (\sec\theta - \tan\theta)^2$

13. If $\sin\theta + \sin^2\theta = 1$, then prove that $\cos^2\theta + \cos^4\theta = 1$

14. The diameter of a bicycle wheel is 28 inches ; through what distance does its centre move during one revolution of the wheel ?

15. Find θ lying in the interval $[0, 2\pi]$ satisfying the following equations :

(i) $\sin\theta = \frac{1}{2}$ (ii) $\cos\theta = \frac{\sqrt{3}}{2}$ (iii) $\tan\theta = \sqrt{3}$

(iv) $\sin\theta = -\frac{1}{\sqrt{2}}$ (v) $\cos\theta = -\frac{1}{2}$ (vi) $\tan\theta = -\frac{1}{\sqrt{3}}$

DPP No. # B2 (JEE–ADVANCED)

Total Marks : 28		**Max. Time : 24 min.**
Single choice Objective ('–1' negative marking) 1 to Q.2	**(3 marks, 3 min.)**	**[06, 06]**
Multiple choice objective ('–1' negative marking) Q.3,4,5,6	**(4 marks, 3 min.)**	**[16, 12]**
Subjective Questions ('–1' negative marking) Q.7,8	**(3 marks, 3 min.)**	**[06, 06]**

Question No.	1	2	3	4	5	6	7	8	Total
Marks Obtained									

1. If $\sin\theta = 5\sin(\theta + \phi)$, then $\tan(\theta + \phi) =$

(A) $\frac{\sin\phi}{\cos\phi - 3}$ (B) $\frac{\sin\phi}{\cos\phi + 3}$ (C) $\frac{\sin\phi}{\cos\phi - 5}$ (D) $\frac{\cos\phi}{\sin\phi + 5}$

2. If $P = \frac{\sin 300^\circ \cdot \tan 330^\circ \cdot \sec 420^\circ}{\tan 135^\circ \cdot \sin 210^\circ \cdot \sec 315^\circ}$ & $Q = \frac{\sec 480^\circ \cdot \operatorname{cosec} 570^\circ \cdot \tan 330^\circ}{\sin 600^\circ \cdot \cos 660^\circ \cdot \cot 405^\circ}$, then P & Q are respectively

(A) 2 , 16 (B) $\sqrt{2}, \frac{16}{3}$ (C) $-2, \frac{3}{16}$ (D) none of these

3. For $m \in R$, let $f(x) = x^3 + 3mx^2 - 3x - 3m + 2$ has 3 real roots x_1, x_2 and x_3. Also k denotes the value of m for which $\left(x_1^2 + x_2^2 + x_3^2\right)$ is minimum. Which of the following statement(s) is/are correct ?

(A) f(x) has all 3 roots real and distinct corresponding to m for which is $\left(x_1^2 + x_2^2 + x_3^2\right)$ minimum

(B) The value of k lies in [–1, 1]

(C) The minimum value of $\sum_{i=1}^{3} x_i^2$ equals 6.

(D) Number of roots of $\sin x = k$ in $[0, 2\pi]$ equals 3.

4. The integral values of x for which $x^2 + 7x + 13$ is perfect square are α and β then

(A) α and β are –ve integer (B) $\alpha^2 + \beta^2$ is perfect square of an integer

(C) atleast one of the value α or β is negative (D) atleast one of the value α or β is prime

5. If quadratic equation $(x + a)(x + 1991) + 1 = 0$ has integral roots then

(A) Number of Integral values of a are 2

(B) Both the Integral values of a is divisible by 2

(C) one of the Integral value of a is divisible by 2

(D) If the Integral values of a are α & β such that $\alpha > \beta$ then $\alpha - \beta = 4$

6. If both the roots of equation $ax^2 + x + c - a = 0$ are imaginary and $c > -1$, then $(a \in R)$

(A) $3a > 2 + 4c$ (B) $3a < 2 + 4c$ (C) $c > a$ (D) $a < 0$

7. Find the number of integral values of 'a' for which $ax^2 - (3a + 2)x + 2(a + 1) < 0$, $a \neq 0$ holds exactly four integral value of x.

8. Let x_1, x_2, x_3 be 3 roots of the cubic $x^3 - x - 1 = 0$.
Then the expression $x_1(x_2 - x_3)^2 + x_2(x_3 - x_1)^2 + x_3(x_1 - x_2)^2$ equals a rational number.
Find the absolute value of the number.

DPP No. # B3 (JEE–ADVANCED)
Special DPP on "Trigonometry and Sequence Series"

Total Marks : 56 **Max. Time : 45 min.**
Single choice Objective ('-1' negative marking) Q.1 ot Q.4 **(3 marks 3 min.) [12, 12]**
Multiple choice objective ('-2' negative & Partial marking) Q.5 to Q.15 **(4 marks 3 min.) [44, 33]**

Question No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Marks Obtained																

1. Let $f(\theta) = \frac{1}{2} + \frac{2}{3}\operatorname{cosec}^2\theta + \frac{3}{8}\sec^2\theta$. The least value of $f(\theta)$ for all permissible values of θ, is

(A) $\frac{31}{12}$ (B) $\frac{61}{48}$ (C) $\frac{61}{25}$ (D) $\frac{61}{24}$

2. If $f(x) = \frac{1 - \sin 2x + \cos 2x}{2\cos 2x}$, then the value of $f(16^\circ) \cdot f(29^\circ)$ is

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

3. If $P = (\tan(3^{n+1}\theta) - \tan\theta)$ and $Q = \sum_{r=0}^{n} \frac{\sin(3^r\theta)}{\cos(3^{r+1}\theta)}$, then

(A) P = 2Q (B) P = 3Q (C) 2P = Q (D) 3P = Q

4. Let a sequence whose n^{th} term is $\{a_n\}$ be defined as

$a_1 = \frac{1}{2}$ and $(n - 1)a_{n-1} = (n + 1)a_n$ for $n \geq 2$ then $\lim_{n\to\infty} S_n$ equals

(A) $\frac{3}{4}$ (B) $\frac{5}{4}$ (C) $\frac{3}{2}$ (D) 1

5. Which of the following are the solutions of equation $2\sin 11x + \cos 3x + \sqrt{3}\sin 3x = 0$?

(A) $x = \frac{n\pi}{7} - \frac{\pi}{84}, n \in Z$ (B) $x = \frac{n\pi}{4} + \frac{7\pi}{48}, n \in Z$

(C) $x = \frac{n\pi}{7} - \frac{\pi}{63}, n \in Z$ (D) $x = \frac{n\pi}{4} + \frac{\pi}{24}, n \in Z$

6. If $\cos 3\theta + \sin 3\theta + (2\sin 2\theta - 3)(\sin\theta - \cos\theta) > 0$, then subset of values of θ is

(A) $\left(2n\pi - \frac{3\pi}{4},\ 2n\pi + \frac{\pi}{4}\right), n \in Z$ (B) $\left(2n\pi - \frac{\pi}{2},\ 2n\pi + \frac{\pi}{6}\right), n \in Z$

(C) $\left(2n\pi - \frac{\pi}{3},\ 2n\pi + \frac{\pi}{3}\right), n \in Z$ (D) $\left(2n\pi - \frac{\pi}{4},\ 2n\pi + \frac{3\pi}{4}\right), n \in Z$

7. In a ΔABC, if $\tan\frac{A}{2}=\frac{5}{6}$, $\tan\frac{B}{2}=\frac{20}{37}$, then which of the following is/are correct ?

(A) B > C (B) B < C (C) a > b > c (D) a < b < c

8. For all permissible values of x, if $y=\frac{\sin 3x(\cos 6x+\cos 4x)}{\sin x(\cos 8x+\cos 2x)}$, then range of y is $(-\infty, a)\cup(b,\infty)$. If '2b' is the first term of G.P. and 'a' is its common ratio, then

(A) $b-a=\frac{10}{3}$ (B) $3a+b=4$ (C) $S_\infty=9$ (D) $S_\infty=\frac{27}{10}(a+b)$

9. If b + c, c + a, a + b are in H.P., then which of the following hold(s) good?

(A) $\frac{b+c}{a},\frac{c+a}{b},\frac{a+b}{c}$ are in A.P. (B) $\frac{b+c}{a},\frac{c+a}{b},\frac{a+b}{c}$ are in H.P.

(C) a^2, b^2, c^2 are in A.P. (D) a^2, b^2, c^2 are in H.P.

10. Three friends whose ages form a G.P. divide a certain sum of money in proportion to their ages. If they do that three years later, when the youngest is half the age of the oldest, then he will receive 105 rupees more that he gets now and the middle friend will get 15 rupees more that he gets now, then ages of the friends are

(A) 12, 18, 27 (B) 6, 12, 24 (C) 8, 18, 36 (D) divisible by 3

11. The roots of the equation $x^5-40x^4+ax^3+bx^2+cx+d=0$ are in GP. If sum of reciprocals of the roots is 10, then

(A) | c | = 40 (B) | d | = 4 (C) | d | = 32 (D) | c | = 320

12. The number of terms of an A.P. is even; the sum of the odd terms is 310; the sum of the even terms is 340; the last term exceeds the first by 57. Then

(A) Number of terms of the series = 20 (B) Number of terms of the series = 10

(C) The first term of series = 4 (D) The first term of series = 5

13. a, b, c are the first three terms of geometric series. If the H.M. of *a* and *b* is 12 and that of b and c is 36 then which of the following hold(s) good?

(A) Sum of the first term and common ratio of the G.P. is 11.

(B) Sum of the first five terms of the G.P. is 948.

(C) If the value of the the first term and common ratio of the given G.P. is taken as the first term and common difference of an A.P. then its 8^{th} term is 29.

(D) The number 648 is one of the term of the G.P.

14. Consider a decreasing G.P. : $g_1, g_2, g_3, \ldots\ldots g_n \ldots\ldots$ such that $g_1+g_2+g_3=13$ and $g_1^2+g_2^2+g_3^2=91$ then which of the following does hold?

(A) The greatest term of the G.P. is 9. (B) $3g_4=g_3$

(C) $g_1=1$ (D) $g_2=3$

15. If a,b,c are positive then which of the following holds good ?

(A) $b^2c^2+c^2a^2+a^2b^2\geq abc(a+b+c)$

(B) $\frac{bc}{a}+\frac{ca}{b}+\frac{ab}{c}\geq a+b+c$

(C) $\frac{bc}{a^3}+\frac{ca}{b^3}+\frac{ab}{c^3}\geq\frac{1}{a}+\frac{1}{b}+\frac{1}{c}$

(D) $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\geq\frac{1}{\sqrt{(bc)}}+\frac{1}{\sqrt{(ca)}}+\frac{1}{\sqrt{(ab)}}$

DPP No. # B4 (JEE–ADVANCED)

Total Marks : 26 **Max. Time : 24 min.**
Single choice Objective ('-1' negative marking) Q.1 to Q.6 **(3 marks 3 min.) [18, 18]**
Multiple choice objective ('-2' negative & Partial marking) Q.7 to Q.8 **(4 marks 3 min.) [08, 06]**

Question No.	1	2	3	4	5	6	7	8	Total
Marks Obtained									

1. If $\frac{\cos x-\cos\alpha}{\cos x-\cos\beta}=\frac{\sin^2\alpha\cos\beta}{\sin^2\beta\cos\alpha}$, then

(A) $\cos x=\frac{\cos\alpha+\cos\beta}{1+\cos\alpha\cos\beta}$ (B) $\cos x=\frac{\cos\alpha+\cos\beta}{1-\cos\alpha\cos\beta}$

(C) $\tan\frac{x}{2}=\tan\frac{\alpha}{2}\tan\frac{\beta}{2}$ (D) $\tan\frac{x}{2}=3\tan\frac{\alpha}{2}\tan\frac{\beta}{2}$

2. For all pairs of angles (A, B), measured in degrees such that

$\sin A+\sin B=\sqrt{2}$ and $\cos A+\cos B=\sqrt{\sqrt{2}}$, both hold simultaneously. The smallest possible value of $|A-B|$ in degrees is

(A) 15 (B) 30 (C) 45 (D) 60

3. If $\cos(\theta+\phi)=m\cos(\theta-\phi)$, then $\tan\theta$ is equal to :

(A) $\left(\frac{1+m}{1-m}\right)\tan\phi$ (B) $\left(\frac{1-m}{1+m}\right)\tan\phi$ (C) $\left(\frac{1-m}{1+m}\right)\cot\phi$ (D) $\left(\frac{1+m}{1-m}\right)\cot\phi$

4. Let α be a real number such that $0\le\alpha\le\pi$. If $f(x)=\cos x+\cos(x+\alpha)+\cos(x+2\alpha)$ takes some constant number c for any $x\in R$, then the value of $[c+\alpha]$ is equal to

(**Note :** [y] denotes greatest integer less than or equal to y.)

(A) 0 (B) 1 (C) – 1 (D) 2

5. If $a_1,a_2,a_3,.....$ are in A.P. and $a_1>0$ for each i, then $\sum_{i=1}^{n}\frac{n}{a_{i+1}^{2/3}+a_i^{2/3}+a_{i+1}^{1/3}a_i^{1/3}}$ is equal to

(A) $\frac{n}{a_{n+1}^{2/3}+a_1^{2/3}+a_{n+1}^{1/3}a_1^{1/3}}$ (B) $\frac{n+1}{a_n^{2/3}+a_n^{1/3}+a_1^{2/3}}$

(C) $\frac{n^2}{a_{n+1}^{2/3}+a_1^{2/3}+a_{n+1}^{1/3}a_1^{1/3}}$ (D) none of these

6. Let n quantities be in A.P., d being the common difference. Let the arithmetic mean of the squares of these quantities exceed the square of the arithmetic mean of these quantities by a quantity p. Then p

(A) is always negative (B) equals $\frac{n^2-1}{12}d^2$ (C) equals $\frac{d^2}{12}$ (D) equals $\frac{n^2-1}{12}$

7. For a sequence $\{a_n\}$, $a_1=2$ and $\frac{a_{n+1}}{a_n}=\frac{1}{3}$. Then $\sum_{r=1}^{\infty}a_r$ is

(A) 2/3 (B) 3 (C) 3/2 (D) prime number

8. The sum of the first three terms of the G.P. in which the difference between the second and the first term is 6 and the difference between the fourth and the third term is 54, is

(A) 39 (B) -10.5 (C) 27 (D) -27

DPP No. # B5 (JEE–MAIN)

Total Marks : 48 **Max. Time : 45 min.**
Single choice Objective ('-1' negative marking) Q.1 to Q.9 **(3 marks 3 min.) [27, 27]**
Multiple choice objective ('-2' negative & Partial marking) Q.10 to Q.12 **(4 marks 3 min.) [12, 09]**
Single Integer Questions ('-1' negative marking)Q. 13 to Q.15 **(3 marks 3 min.) [09, 09]**

Question No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Marks Obtained																

1. Let $S = \sin\sqrt{2} - \sin\sqrt{3}$ and $C = \cos\sqrt{2} - \cos\sqrt{3}$ then which one of the following is correct?
(A) S > 0 and C > 0 (B) S > 0 and C < 0
(C) S < 0 and C > 0 (D) S < 0 and C < 0

2. If $2\tan\frac{\alpha}{2} = \tan\frac{\beta}{2}$, then $\frac{3+5\cos\beta}{5+3\cos\beta}$ is equal to :
(A) $\cos\alpha$ (B) $\cos\beta$ (C) $\sin\alpha$ (D) $\sin\beta$

3. If $2^x = \cos\left(\frac{y}{2}\right)$ and $a^x = \sin y$, then $\sin\left(\frac{y}{2}\right)$ is equal to
(A) $\frac{1}{2}\left(\frac{a}{2}\right)^x$ (B) $\left(\frac{a}{2}\right)^x$ (C) $\frac{a^x}{2}$ (D) $2^{\pi/2}$

4. The number of integral value(s) of 'p' for which the equation $99\cos 2\theta - 20\sin 2\theta = 20p + 35$, will have a solution is
(A) 8 (B) 9 (C) 10 (D) 11

5. The number of integral value(s) of x satisfying the equation $|x^4.3^{|x-2|}.5^{x-1}| = -x^4.3^{|x-2|}.5^{x-1}$ is
(A) 2 (B) 3 (C) 1 (D) infinite

6. For x > 0 the sum of the series $\frac{1}{1+x} - \frac{(1-x)}{(1+x)^2} + \frac{(1-x)^2}{(1+x)^3} - \ldots\ldots\ldots\ldots \infty$ is equal to
(A) $\frac{1}{4}$ (B) $\frac{1}{2}$ (C) $\frac{3}{4}$ (D) 1

7. The equation $x - \frac{8}{|x-3|} = 3 - \frac{8}{|x-3|}$ has
(A) only one solution (B) infinite solutions
(C) no solution (D) two solutions

8. The solution set of the equation $|2x + 3| - |x - 1| = 6$, is
(A) $x \in (-10, 2)$ (B) $x \in [-10, 2)$ (C) $x \in [-10, 2]$ (D) $x \in \{-10, 2\}$

9. The minimum value of the function $y = |2x + 1| + 2|x - 2|$, is
(A) 4x – 3 (B) 3x – 1 (C) 5 (D) 1

10. Let a_1, a_2, a_3 be three positive numbers which are in G.P. with common ratio r. The inequality $a_3 > a_2 + 2a_1$ do not holds if r is equal to
(A) 2 (B) 1.5 (C) 0.5 (D) 2.5

11. If a, b, c are first three terms of a G.P. if the harmonic mean of a and b is 20 and arithmetic mean of b & c is 5, then
(A) no term of this G.P. is square of an integer (B) arithmetic mean of a, b, c is 5
(C) b = ± 6 (D) common ratio of this G.P. is 2

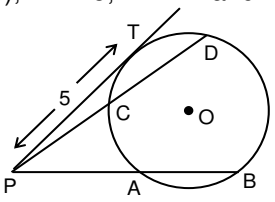
12. The first term of an infinite geometric series is 21. The second term and the sum of the series are both positive integers. The possible value(s) of the second term can be
(A) 14 (B) 20 (C) 12 (D) 18

13. Make the following expressions free from modulus sign : ($x \in R$)
(i) $|x + 2| + |x - 2|$ if $x^2 \le 2$ (ii) $|x^3 + 8|$ (iii) $|x + 3| + |x| + |x - 1|$

14. Evaluate / simpilfy the folowing :

(i) $\left|\sqrt{7-4\sqrt{3}}\right|$ (ii) $\left|\pi-3-\sqrt{8-2\sqrt{15}}\right|$ (iii) $\left|\sqrt[3]{2}-\sqrt[4]{3}\right|$

15. In the given figure (circle), PT = 5, PD = 7 and PA = 2, then the value of PB – PC = ?



DPP No. # B6 (JEE–ADVANCED)

Total Marks : 27	**Max. Time : 24 min.**
Comprehension ('–1' negative marking) Q.1 to Q.2	**(3 marks 3 min.) [06, 06]**
Single choice Objective ('-1' negative marking) Q.3	**(3 marks 3 min.) [03, 03]**
Multiple choice objective ('-2' negative & Partial marking) Q.4 to Q.6	**(4 marks 3 min.) [12, 09]**
Single Integer Questions ('-1' negative marking)Q. 7 to Q.8	**(3 marks 3 min.) [06, 06]**

Question No.	1	2	3	4	5	6	7	8	Total
Marks Obtained									

Comprehension # 1 (Q. No. 1 to 2) .

Let a_1, a_2, a_3 ..... be an arithmetic progression and b_1, b_2, b_3 ,..... be a geometric progression. The sequence c_1 , c_2, c_3, ... is such that $c_n = a_n + b_n \ \forall\ n \in N$. Suppose $c_1 = 1$, $c_2 = 4$, $c_3 = 15$ and $c_4 = 2$.

1. The common ratio of geometric progression is equal to

(A) – 2 (B) – 3 (C) 2 (D) 3

2. The value of the sum $\sum_{i=1}^{20} a_i$ is equal to

(A) 480 (B) 770 (C) 960 (D) 1040

3. If $x = \tan\frac{\pi}{18}$ then $3x^6 - 27x^4 + 33x^2$ is equal to-

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

4. The sequence form by common terms of 17, 21, 25, ... & 16, 21, 26, ... has

(A) common difference 20 (B) sum of first 100 terms is 100100

(C) sum of first 100 terms is 101100 (D) tenth term is 201.

5. If S_n denotes the sum of first n terms of an arithmetic progression and a_n denotes the n^{th} term of the same A.P. given $S_n = n^2 p$; where $p, n \in N$, then

(A) $a_1 = p$ (B) common difference = 2p

(C) $S_p = p^3$ (D) $a_p = 2p^2 - p$

6. If $\log_x a$, $a^{x/2}$, $\log_b x$ are in GP. then x is equal to

(A) $\log_a(\log_b a)$ (B) $\frac{\log(\log a) - \log(\log b)}{\log a}$ (C) $\log_b(\log_a b)$ (D) None of these

7. Solve: $\left|\frac{x^2 - 5x + 4}{x^2 - 4}\right| \le 1$

8. Solve the following equations :

(i) $|x^2 - 2| = 2|x - 3|$ (ii) $|x^2 - 4| + |x^2 - 9| = 0$ (iii) $|x - 1| + |x + 5| = 6$

DPP No. # B7 (JEE–ADVANCED)

Total Marks : 28 **Max. Time : 24 min.**
Single choice Objective ('-1' negative marking) Q.1 to Q.3 **(3 marks 3 min.) [09, 09]**
Multiple choice objective ('-2' negative & Partial marking) Q.4 to Q.7 **(4 marks 3 min.) [16, 12]**
Single Integer Questions ('-1' negative marking) Q.8 **(3 marks 3 min.) [03, 03]**

Question No.	1	2	3	4	5	6	7	8	Total
Marks Obtained									

1. The variable 'x' satisfying the equation $|\sin x \cos x| + \sqrt{2+\tan^2 x+\cot^2 x} = \sqrt{3}$, belongs to the interval

(A) $\left[0,\frac{\pi}{3}\right]$ (B) $\left(\frac{\pi}{3}, \frac{\pi}{2}\right)$ (C) $\left[\frac{3\pi}{4}, \pi\right)$ (D) non existent

2. Let $A_0\ A_1\ A_2\ A_3\ A_4\ A_5$ be a regular hexagon inscribed in a circle of unit radius. Then the product of the lengths of the line segments A_0A_1, A_0A_2 and A_0A_4 is

(A) 3/4 (B) $3\sqrt{3}$ (C) 3 (D) $3\sqrt{3}/2$

3. Let the n^{th} term of a series be given by $t_n = \frac{n^2-n-2}{n^2+3n}$, $n \geq 3$. Then product $t_3\ t_4$ .....t_{50} is equal to

(A) $\frac{1}{5^2.7.13.53}$ (B) $\frac{1}{5.7^2.12.53}$ (C) $\frac{1}{5^2.7.12.51}$ (D) $\frac{1}{5.7^2.13.53}$

4. The sum of the first three terms of an A.P. is 9 and the sum of their squares is 35. The sum to first *n* terms of the series can be

(A) n(n + 1) (B) n^2 (C) n(4 – n) (D) n(6 – n)

5. Consider an A.P. $a_1, a_2, \ldots\ldots a_n, \ldots\ldots$ and the G.P. $b_1, b_2, \ldots\ldots, b_n, \ldots\ldots$ such that $a_1 = b_1 = 1$, $a_9 = b_9$ and $\sum_{r=1}^{9} a_r = 369$, then

(A) $b_6 = 27$ (B) $b_7 = 27$ (C) $b_8 = 81$ (D) $b_9 = 81$

6. If $\sum_{r=1}^{n} r(r+1) = \frac{(n+a)(n+b)(n+c)}{3}$, where a > b > c, then

(A) 2b = c (B) $a^3 - 8b^3 + c^3 = 8abc$ (C) a is prime number (D) $(a-2b)^2 = 0$

7. If 5sinx cosy = 1 and 4 tanx = tany, then

(A) $x = (m + 2n)\frac{\pi}{2} + \frac{\pi}{4} + (-1)^m \frac{1}{2}\sin^{-1}\left(-\frac{3}{5}\right)$; $m, n \in Z$

(B) $y = (2n - m)\frac{\pi}{2} + \frac{\pi}{4} + (-1)^{m+1} \frac{1}{2}\sin^{-1}\left(-\frac{3}{5}\right)$; $m, n \in Z$

(C) $x = (m + n)\frac{\pi}{2} + \frac{\pi}{4} + (-1)^m \frac{1}{2}\sin^{-1}\left(-\frac{3}{5}\right)$; $m, n \in Z$

(D) $y = (n - m)\frac{\pi}{2} + \frac{\pi}{4} + (-1)^{m+1} \frac{1}{2}\sin^{-1}\left(-\frac{3}{5}\right)$; $m, n \in Z$

8. Solve :

(i) $-2 \leq \left|\left|x^2+1\right|-3\right| \leq 7$

(ii) $|x^2 - 4x| \leq 5$

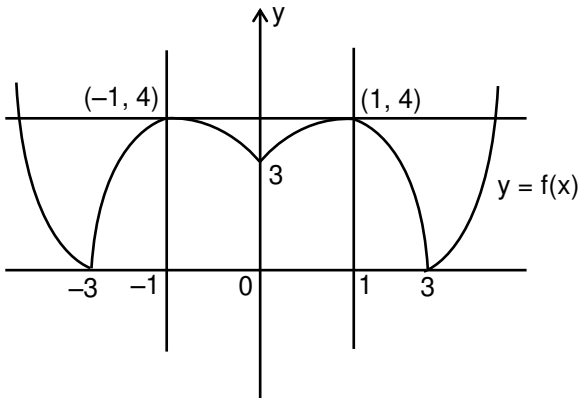
DPP No. # B8 (JEE–ADVANCED)

Total Marks : 28 **Max. Time : 24 min.**
Single choice Objective ('-1' negative marking) Q.1 to Q.3 **(3 marks 3 min.) [09, 09]**
Multiple choice objective ('-2' negative & Partial marking) Q.4 to Q.7 **(4 marks 3 min.) [16, 12]**
Single Integer Questions ('-1' negative marking) Q.8 **(3 marks 3 min.) [03, 03]**

Question No.	1	2	3	4	5	6	7	8	Total
Marks Obtained									

1. Number of roots of equation $3^{|x|} - |2 - |x|| = 1$ is
(A) 0 (B) 2 (C) 4 (D) 7

2. Study carefully the graph of a certain function.



The graph corresponds to
(A) $y = ||x|^2 - |x| - 6|$ (B) $|y| = ||x|^2 - 2|x| - 3|$
(C) $y = ||x|^2 - 2|x| - 3|$ (D) $|y| = ||x|^2 - |x| - 6|$

3. If the r^{th} term of a series is $1 + x + x^2 + ...+ x^{r-1}$, then the sum of the first *n* terms is
(A) $\frac{n+(n+1)x+x^{n+1}}{(1-x)^2}$ (B) $\frac{n-(n+1)x-x^{n+1}}{(1-x)^2}$
(C) $\frac{n-(n+1)x+x^{n+1}}{(1-x)^2}$ (D) $\frac{n+(n+1)x-x^{n}}{(1-x)^2}$

4. If $\sin\left(\frac{6}{5}x\right) = 0$ and $\cos\left(\frac{x}{5}\right) = 0$, then $(n \in Z)$
(A) $x = (n-5)\pi$ (B) $x = 6(n-1)\pi$ (C) $x = 5\left(n-\frac{1}{2}\right)\pi$ (D) $x = 5\left(n+\frac{1}{2}\right)\pi$

5. If $S_n = \left(1-\frac{4}{1}\right)\left(1-\frac{4}{9}\right)\left(1-\frac{4}{25}\right)$ ..... $\left(1-\frac{4}{(2n-1)^2}\right)$, where $n \in N$, then
(A) $S_n = \frac{1+2n}{1-2n}$ (B) $S_n = \frac{1-2n}{1+2n}$ (C) $S_\infty = -1$ (D) $S_\infty = -2$

6. If $S_n = 1 + 3 + 7 + 13 + 21 +$ ..... upto n terms, then
(A) $S_{10} = 340$ (B) $T_{10} = 91$ (C) $S_{10} = 430$ (D) $T_6 = 31$

7. If a, b,c,d, e are five positive numbers, then
(A) $\left(\frac{a}{b}+\frac{b}{c}\right)\left(\frac{c}{d}+\frac{d}{e}\right) \geq 4\sqrt{\frac{a}{e}}$ (B) $\frac{b}{a}+\frac{c}{b}+\frac{d}{c}+\frac{e}{d}+\frac{a}{e} \geq 5$
(C) $\frac{a}{b}+\frac{b}{c}+\frac{c}{d}+\frac{d}{e}+\frac{e}{a} < 5$ (D) None of these

8. Solve :
(i) $|x^2 - 2x| \le x$ (ii) $(x^2 - 9)(|x| - 2) \le 0$

DPP No. # B9 (JEE– MAIN)

Total Marks : 49 **Max. Time : 45 min.**
Single choice Objective ('-1' negative marking) Q.1 **(3 marks 3 min.) [03, 03]**
Multiple choice objective ('-2' negative & Partial marking) Q.2 to Q.5 **(4 marks 3 min.) [16, 12]**
Single Integer Questions ('-1' negative marking) Q.6 to Q.15 **(3 marks 3 min.) [30, 30]**

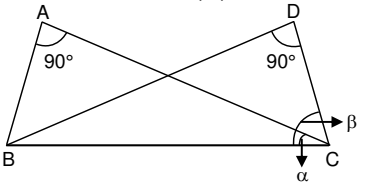
Question No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Marks Obtained																

1. α, β, γ and δ are the smallest positive angle in ascending order of magnitude which have their sines equal to the positive quantity k. The value of $4 \sin \frac{\alpha}{2} + 3 \sin \frac{\beta}{2} + 2 \sin \frac{\gamma}{2} + \sin \frac{\delta}{2}$ is equal to
(A) $2\sqrt{1-k}$ (B) $2\sqrt{1+k}$ (C) $2\sqrt{k}$ (D) 2 k

2. If the first & the $(2n + 1)^{th}$ terms of an A.P., a G.P. & a H.P. of positive terms are same and their $(n + 1)^{th}$ terms are a, b & c respectively, then :
(A) a = b = c (B) $a \ge b \ge c$ (C) a + c = 2b (D) $ac = b^2$.

3. p, q, r are three positive real numbers in A.P., then the roots of the quadratic equation $px^2 + qx + r = 0$ are real for
(A) $\left|\frac{r}{p} - 7\right| \ge 4\sqrt{3}$ (B) $\left|\frac{p}{r} - 7\right| \ge 4\sqrt{3}$ (C) all p and r (D) no p and r

4. In the given figure AB, BC, BD cannot be in
(A) A.P. (B) G.P. (C) H.P. (D) None of these



5. If $x \in R$, the numbers $2^{1+x} + 2^{1-x}$, b/2, $36^x + 36^{-x}$ form an A.P., then b may lie in the interval
(A) $[12, \infty)$ (B) $[6, \infty)$ (C) $(-\infty, 6]$ (D) [6, 12]

6. Is 184 a term of the sequence 3, 7, 11, ... ?

7. Suba Rao started work in 1995 at an annual salary of Rs 5000 and received a Rs 200 raise each year. In what year did his annual salary will reach Rs 7000 ?

8. Solve: $\frac{|x-3|}{x^2 - 5x + 6} \ge 2$

9. Solve: $|x| - |x - 2| \ge 1$

10. Draw graph of the following expressions. Also find extremum value if it exists.
(i) $y = |x - 2| + |x - 1| + |x + 1| + |x + 2|$
(ii) $y = |2x - 5| - 2|2x + 5|$
(iii) $y = |2x - 1| + |x - 1|$
(iv) $y = |x - 1| - |x - 6|$

11. Solve the following equations :
(i) $|x - 3| = x - 1$
(ii) $|x^2 - 3x| = 2x - 6$
(iii) $|x - 4| + |x - 7| = 11$

12. If $\frac{1}{|a|} > \frac{1}{b}$, then $|a| < b$, where a & b are non-zero real numbers.

Solve the following equations (Q. No.13 to 15)

13. $|x| + 2|x - 6| = 12$

14. $||x + 3| - 5| = 2$

15. $|||x - 2| - 2| - 2| = 2$

DPP No. # B10 (JEE–ADVANCED)

Total Marks : 25	**Max. Time : 24 min.**
Single choice Objective ('-1' negative marking) Q.1 to Q.4	**(3 marks 3 min.) [12, 12]**
Multiple choice objective ('-2' negative & Partial marking) Q.5	**(4 marks 3 min.) [04, 03]**
Single Integer Questions ('-1' negative marking) Q.6 to Q.8	**(3 marks 3 min.) [09, 09]**

Question No.	1	2	3	4	5	6	7	8	Total
Marks Obtained									

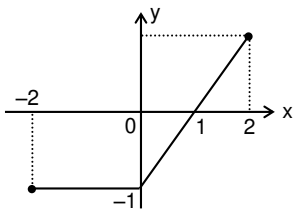
1. If $\sum_{n=1}^{2013} \tan\left(\frac{\theta}{2^n}\right)\sec\left(\frac{\theta}{2^{n-1}}\right) = \tan\left(\frac{\theta}{2^a}\right) - \tan\left(\frac{\theta}{2^b}\right)$ then (b + a) equals

(A) 2014 (B) 2012 (C) 2013 (D) 2014

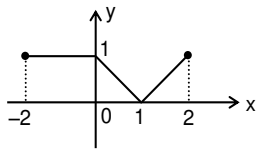
2. The minimum value of the expression $|x - p| + |x - 15| + |x - p - 15|$ for 'x' in the range $p \le x \le 15$, where $0 < p < 15$ is

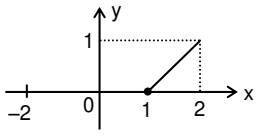
(A) 10 (B) 15 (C) 30 (D) 0

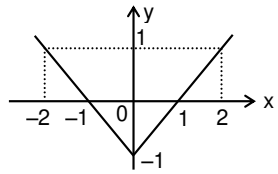
3. If the graph of the function y = f(x) is as shown :

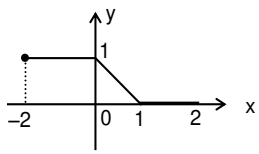


then the graph of $y = 1/2(|f(x)| - f(x))$ is

(A)


(B)


(C)


(D)


4. If A, B, C, D are the angles of a quadrilateral, then $\frac{\tan A+\tan B+\tan C+\tan D}{\cot A+\cot B+\cot C+\cot D}$ is equal to

(A) tan A tan B tan C tan D (B) cot A cot B cot C cot D

(C) $\tan^2 A + \tan^2 B + \tan^2 C + \tan^2 D$ (D) $\sum \tan A \quad \tan B \tan C$

5. If the sum of n terms of the series $\frac{5}{1.2.3}+\frac{6}{2.3.4}+\frac{7}{3.4.5}+\ldots\ldots\ldots$ is $\frac{a}{2}-\frac{n+b}{(n+1)(n+2)}$, then

(A) a = 3 (B) b = 2 (C) b = 3 (D) a = 2

6. If the 8^{th} term of an A.P. is 31 and the 15^{th} term is 16 more than the 11^{th} term. Find the A.P.

7. The coefficient of the quadratic equation $ax^2 + (a + d)x + (a + 2d) = 0$ are consecutive terms of a positively valued, increasing arithmetic sequence. Determine the least integral value of $\frac{d}{a}$ such that the equation has real solutions.

8. Let $f(r)=\sum_{j=2}^{2008}\frac{1}{j^r}=\frac{1}{2^r}+\frac{1}{3^r}+\ldots\ldots+\frac{1}{2008^r}$. Find $\sum_{k=2}^{\infty} f(k)$

DPP No. # B11 (JEE–ADVANCED)
Special DPP on "Formulae Based Questions "

Total Marks : 94	**Max. Time : 90 min.**
Single choice Objective ('-1' negative marking) Q.1 to Q.20	**(3 marks 3 min.) [60, 60]**
Multiple choice objective ('-2' negative & Partial marking) Q.21 to 24	**(4 marks 3 min.) [16, 12]**
Single Integer Questions ('-1' negative marking) Q.25 to Q.30	**(3 marks 3 min.) [18, 18]**

Question No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Marks Obtained																
Question No.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Marks Obtained																

1. If $\sin\alpha\cos\beta = \frac{-1}{2}$ then find the range of value of $\cos\alpha\sin\beta$

(A) $\left[-\frac{1}{2}, 1\right]$ (B) $\left[-\frac{1}{2}, 0\right]$ (C) $\left[-\frac{1}{2}, \frac{3}{2}\right]$ (D) [–1, 1]

2. –cos(A + B)cos(B – A) =

(A) $\cos^2 A - \sin^2 B$ (B) $\cos^2 B - \sin^2 A$ (C) $\sin^2 B - \cos^2 A$ (D) None of these

3. Find the value of $x\sqrt{6x^4+4x^2+2} > -2x^2+5x-4$

(A) $x \in (-\infty, -1)$ (B) [–1, 1] (C) (1, ∞) (D) R

4. $S = n \times 10^{6m} + n \times 10^{6m-1} + n \times 10^{6m-2} + \ldots + n \times 10 + n - 10$ m $\in I$, n = single digit +ve integer. then the remainder if
(1) S is divided by 13 is a (2) it S is divided by 11 is b (3) it S is divided by 7 is c
a + b + c =
(A) 5 (B) 6 (C) 7 (D) 8

5. Number of roots of $(x^2 + 5x + 7)(-x^2 + 3x - 4) = 0$
(A) 0 (B) 2 (C) 4 (D) can't determine

6. If the roots of Quadratic $i^2 x^2 + 5ix - 6$ are a + ib and c + id (a, b, c, d $\in$ R and $i = \sqrt{-1}$) then, (ac – bd) + (ad + bc) i = ?
(A) 6 (B) –6 (C) 6i (D) None of these

7. $S_{10} = \cos\frac{\pi}{180} + \cos\frac{3\pi}{180} + \ldots\ldots\ldots \cos\frac{19\pi}{180}$

(A) $\frac{\sin\frac{\pi}{9}\cos\frac{\pi}{18}}{\sin\frac{\pi}{90}}$ (B) $\frac{\sin\frac{\pi}{18}\cos\frac{\pi}{18}}{\sin\left(\frac{\pi}{180}\right)}$ (C) $\frac{\sin\frac{\pi}{18}\cos\frac{\pi}{9}}{\sin\left(\frac{\pi}{180}\right)}$ (D) $\frac{\cos\frac{\pi}{18}\cos\frac{\pi}{9}}{\sin\left(\frac{\pi}{180}\right)}$

8. Find the sum of the series $31^3 + 32^3 + \ldots.50^3$
(A) 1509400 (B) 1509600 (C) 1409400 (D) 1409600

9. Find maximum value of a^2b^3 if a + b = 2. When a & b are positive numbers
(A) $\frac{2^5 3^5}{2^5}$ (B) $\frac{2^7 3^3}{5^5}$ (C) $\frac{2^8 3^2}{5^5}$ (D) $\frac{2^6 3^4}{5^5}$

10. Find the roots of the equation $x^2 + ix - 1 - i = 0$
(A) 1 & i (B) i & –i (C) 1 – i & 1 (D) 1 & – i – 1

11. solve $||x - 2| - 1| < 2$
(A) (–2, 5) (B) (–1, 5) (C) (–2, –1) (D) (0, 5)

12. If $x^3 + 2x - 3 = 0$ then then number of real values of 'x' satisfying the equation is :
(A) 0 (B) 1 (C) 2 (D) 3

13. solve for x
$|x + 1| + |x - 2| + |x - 5| = 4$
(A) –3, 1 (B) 2 (C) –1, 1 (D) no solution

14. If $|a - b| > ||a| - |b||$ then
(A) a.b > 0 (B) a.b $\geq$ 0 (C) a.b < 0 (D) a.b $\leq$ 0

15. The inequation $\sqrt{f(x)} > g(x)$, is equivalent to the
(A) $g(x) \leq 0$ & $f(x) \geq 0$ or $g(x) \geq 0$ & $f(x) > g(x)$
(B) $g(x) \leq 0$ & $f(x) \geq 0$ or $g(x) \geq 0$ & $f(x) > g^2(x)$
(C) $g(x) \leq 0$ & $f(x) \geq 0$ or $g(x) \geq 0$ & $f^2(x) > g^2(x)$
(D) $g(x) \leq 0$ & $f(x) \geq 0$ or $g(x) \geq 0$ & $f(x) < g^2(x)$

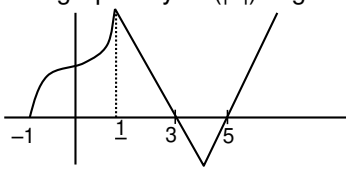
16. The value of $\sin\theta + \sin3\theta + \sin5\theta + ... + \sin(2n-1)\theta$ is
(A) $\frac{\cos^2 n\theta}{\sin\theta}$ (B) $\frac{\sin^2 n\theta}{\cos\theta}$ (C) $\frac{\sin^2 n\theta}{\sin\theta}$ (D) $\frac{\cos^2 n\theta}{\cos\theta}$

17. If a, b, c $\in$ R and equations $ax^2 + bx + c = 0$ and $x^2 + 2x + 9 = 0$ have a common root then
(A) a : b : c = 1 : 2 : 9 (B) a : b : c = 9 : 2 : 4
(C) a : b : c = 9 : 2 : 1 (D) a : b : c = 2 : 1 : 9

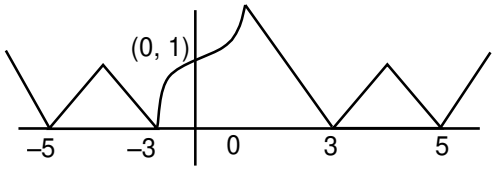
18. Find the value of $\cos\theta \cdot \cos 2\theta \cdot \cos 2^2\theta \cdot \cos 2^3\theta$ ..... $\cos 2^{n-1}\theta$ is

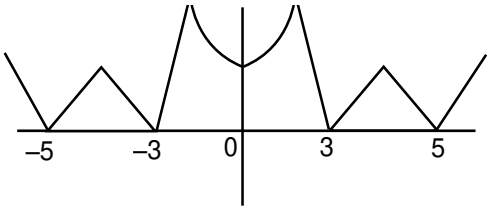
(A) $\frac{\cos 2^n\theta}{2^n \sin\theta}$ (B) $\frac{\sin 2^n\theta}{2^n \cos\theta}$ (C) $\frac{\cos 2^n\theta}{2^n \cos\theta}$ (D) $\frac{\sin 2^n\theta}{2^n \sin\theta}$

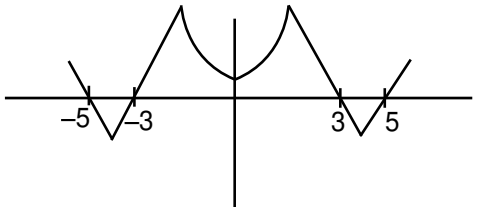
19. The graph of y = f(|x|) is given below



then the graph y = |f(x)|

(A)


(B)


(C)


(D) None of these

20. $\left(\frac{\cos 15^\circ - \sin 15^\circ + 1}{\cos 15^\circ + \sin 15^\circ + 1}\right)\left(\frac{1 + \sin 15^\circ}{\cos 15^\circ}\right) =$

(A) $2 - \sqrt{3}$ (B) 1 (C) $2 + \sqrt{3}$ (D) None of these

21. Which of the following is true :

(A) $\sin\frac{\pi}{12} = \frac{\sqrt{3}-1}{2\sqrt{2}}$ (B) $\cos\frac{\pi}{12} = \frac{\sqrt{3}+1}{2\sqrt{2}}$

(C) $\tan 15^\circ = 2 - \sqrt{3}$ (D) $\sin\frac{\pi}{10} = \frac{\sqrt{5}-1}{4}$

22. tanA + tanB + tanC = tanA tanB tanC if
(A) A + B + C = π (B) A + B + C = 2π (C) A + B + C = $n\pi$ (D) A + B + C = $\pi/2$

23. Which of the following is true If A + B + C = π

(A) $\sin 2A + \sin 2B + \sin 2C = 4 \sin A \sin B \sin C$

(B) $\sin A + \sin B + \sin C = 4 \cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

(C) $\cos 2A + \cos 2B + \cos 2C = -1 - 4 \cos A \cos B \cos C$

(D) $\cos A + \cos B + \cos C = 1 + 4 \sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

24. If $a_1 x^2 + b_1 x + c_1 = 0$ and $a_2 x^2 + b_2 x + c_2 = 0$ has only one root is common, and α is the common root then

(A) $\alpha = \dfrac{c_1 a_2 - c_2 a_1}{a_1 b_2 - a_2 b_1} = \dfrac{b_1 c_2 - b_2 c_1}{c_1 a_2 - c_2 a_1}$

(B) $\alpha = \dfrac{c_1 a_2 - c_2 a_1}{a_1 b_2 - a_2 b_1} = \dfrac{b_1 c_2 - b_2 c_1}{c_1 a_2 - c_2 a_1}$

(C) the condition for one common root is $(c_1 a_2 - c_2 a_1)^2 = (a_1 b_2 - a_2 b_1)(b_1 c_2 - b_2 c_1)$

(D) The condition for one common root is $(a_1 b_2 - b_1 a_2)^2 = (c_1 a_2 - a_1 c_2)(b_1 c_2 - b_2 c_1)$

25. Find the average of sin2º, sin4º, sin6º , ... , sin180º

26. Find maximum and minimum values of $9\cos^2 x + 48 \sin x \cos x - 5\sin^2 x - 2$

27. Find maximum and minimum values of $2 \sin\left(\theta + \dfrac{\pi}{6}\right) + \sqrt{3} \cos\left(\theta - \dfrac{\pi}{6}\right)$

28. Solve $\dfrac{\tan 3x - \tan 2x}{1 + \tan 3x \tan 2x} = 1$

29. Solve $\cos x + \cos 3x - 2\cos 2x = 0$

30. Find the solution of the equation $[x] + \{-x\} = 2x$, (where [.] and { . } represents greatest integer function and fractional part function respectively).

DPP No. # B12 (JEE–ADVANCED)

Total Marks : 27	**Max. Time : 24 min.**
Single choice Objective ('-1' negative marking) Q.1 to Q.3	**(3 marks 3 min.) [09, 09]**
Multiple choice objective ('-2' negative & Partial marking) Q.4 to Q.6	**(4 marks 3 min.) [12, 09]**
Single Integer Questions ('-1' negative marking) Q.7 to Q.8	**(3 marks 3 min.) [06, 06]**

Question No.	1	2	3	4	5	6	7	8	Total
Marks Obtained									

1. If $\tan\alpha, \tan\beta, \tan\gamma$ are the roots of the equation, $x^3 - (a + 1)x^2 + (b - a)x - b = 0$, $(b - a \neq 1)$

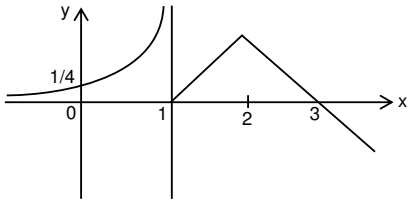
Where $\alpha + \beta + \gamma$ lies between 0 & π then $\alpha + \beta + \gamma$ is equal to

(A) $\pi/4$ (B) $\pi/2$ (C) $3\pi/4$ (D) None of these

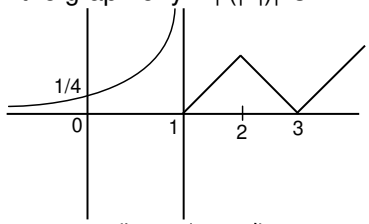
2. Value of $\dfrac{4\sin 9^\circ \sin 21^\circ \sin 39^\circ \sin 51^\circ \sin 69^\circ \sin 81^\circ}{\sin 54^\circ}$ is equal to

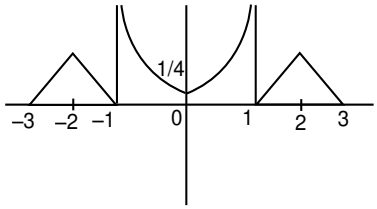
$\dfrac{1}{16}$ (B) $\dfrac{1}{32}$ (C) $\dfrac{1}{8}$ (D) $\dfrac{1}{4}$

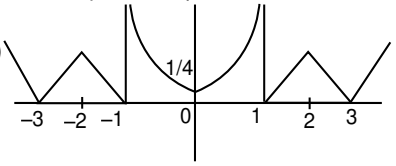
3. The graph of y = f(x) is given below



then the graph of y = |f(|x|)| is :

(A) 

(B) 

(C) 

(D) none of these

4. If a, b, c are distinct positive numbers in H.P. then which of the relations must always hold good?

(A) $\frac{b}{c} = \frac{a-b}{b-c}$ (B) $b^2 > ac$ (C) $b^2 < ac$ (D) $\frac{a}{c} = \frac{a-b}{b-c}$

5. If the sum of first 100 terms of an arithmetic progression is – 1 and the sum of the even terms lying in first 100 terms is 1, then which of the following statement(s) is (are) correct ?

(A) Common difference of the arithmetic progression is $-\frac{3}{50}$

(B) First term of the arithmetic progression is $\frac{149}{50}$

(C) 100^{th} term of the arithmetic progression is $\frac{74}{25}$

(D) Sum of the an infinite geometric progression whose first term is $\frac{47}{25}$ and common ratio is common difference of arithmetic sequence, equals 2.

6. If the solution of the equation $|(x^4–9) —(x^2 + 3)| = |x^4 – 9| – |x^2 + 3|$ is $(–\infty, p] \cup [q, \infty)$ then

(A) p + q = 0 (B) |p| + |q| = 4 (C) |q – p| = 4 (D) |pq| = 4

7. Let T_n denotes the n^{th} term of a G.P. with common ratio 2 and $(\log_2(\log_3(\log_{512} T_{100}))) = 1$. If three sides of a triangle ABC are the values of $(T_1 + T_2)$, T_2 and T_3 then area of the triangle is $\frac{\sqrt{2160}}{N}$, where N is a positive integer. Find the remainder when N is divided by 2^{10}.

8. Draw the labled graph of following

(i) y = |7 – 2x| (ii) y = |x – 1| – |3x – 2| (iii) y = |x – 1| + |x – 4| + |x – 7|

DPP No. # B13 (JEE–ADVANCED)

Total Marks : 29	**Max. Time : 24 min.**
Single choice Objective ('-1' negative marking) Q.1 to Q.2	**(3 marks 3 min.) [06, 06]**
Multiple choice objective ('-2' negative & Partial marking) Q.3 to Q.7	**(4 marks 3 min.) [20, 15]**
Single Integer Questions ('-1' negative marking) Q.8	**(3 marks 3 min.) [03, 03]**

Question No.	1	2	3	4	5	6	7	8	Total
Marks Obtained									

1. Which one of the following inequality holds good.
(A) cos 12º < tan 12º < cosec 12º < cot 12º (B) cos 12º < tan 12º < cot 12º < cosec 12º
(C) tan 12º < cos 12º < cosec 12º < cot 12º (D) tan 12º < cos 12º < cot 12º < cosec 12º

2. If $x = \cos\alpha + \cos\beta - \cos(\alpha+\beta)$ and $y = 4\sin\frac{\alpha}{2}\sin\frac{\beta}{2}\cos\left(\frac{\alpha+\beta}{2}\right)$, then (x – y) equals
(A) 0 (B) 1 (C) – 1 (D) – 2

3. Consider the series
$1 + 2(1-x) + 3(1-x)(1-2x) + \ldots\ldots + n(1-x)(1-2x)\ldots\ldots(1-(n-1)x)$
(A) $S_n = -\frac{1}{x}[(1-x)(1-2x)\ldots\ldots(1-nx)-1]$ (B) $S_6 = -\frac{1}{x}[(1-x)(1-2x)\ldots(1-6x)-1]$
(C) $S_n = \frac{1}{x}[(1-x)(1-2x)\ldots\ldots(1-nx)-1]$ (D) $T_5 = 5(1-x)(1-2x)\ldots\ldots(1-4x)$

4. If a, b respectively be the numbers of solutions and sum of solutions of $\left|\frac{2x}{x-1}\right| - |x| = \frac{x^2}{|x-1|}$, then
(A) a = 3 (B) b = 1 (C) b = 2 (D) a = 2

5. The equation $|x+2| - |x+1| + |x-1| = K$, $x \in R$ has two solutions if K is equal to
(A) 4 (B) 3/2 (C) 5/2 (D) 3

6. If $|\sin^2x + 17 - x^2| = |16 - x^2| + 2\sin^2x + \cos^2x$ then subsets of solution are
(A) {0} (B) [– 4, 4] (C) [– 8, 8] (D) $\left[-\sqrt{17},\sqrt{17}\right]$

7. Solution set of the inequality $\sqrt{7-x} > 2x-3$, is contained by the set
(A) $\left(\frac{11+\sqrt{89}}{8},\infty\right)$ (B) $(-\infty,7)$ (C) $\left(-\infty,\frac{11+\sqrt{89}}{8}\right)$ (D) $(-\infty,3)$

8. a, b, c are positive real numbers forming a. G.P. If $ax^2 + 2bx + c = 0$ and $dx^2 + 2ex + f = 0$ have a common root, then prove that d/a, e/b, f/c are in A.P.

DPP No. # B14 (JEE– MAIN)

Total Marks : 45 **Max. Time : 45 min.**
Single choice Objective ('-1' negative marking) Q.1 to Q.5 **(3 marks 3 min.) [15, 15]**
Single Integer Questions ('-1' negative marking) Q.6 to Q.15 **(3 marks 3 min.) [30, 30]**

Question No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Marks Obtained																

1. Let $y = \cos x(\cos x - \cos 3x)$. Then y is
(A) ≥ 0 only when $x \geq 0$ (B) ≤ 0 for all real x
(C) ≥ 0 for all real x (D) ≤ 0 only when $x \leq 0$

2. The $(m+1)^{th}$ term of $\left(\frac{x}{y}+\frac{y}{x}\right)^{2m+1}$ is:
(A) independent of x (B) a constant
(C) depends on the ratio x/y and m (D) none of these

3. The remainder when 2^{2003} is divided by 17 is :
(A) 1 (B) 2 (C) 8 (D) None of these

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. sin 36º sin 72º sin 108º sin 144º =

(A) $\frac{1}{4}$ (B) $\frac{1}{16}$ (C) $\frac{3}{4}$ (D) $\frac{5}{16}$

6. In an A.P. the third term is four times the first term, and the sixth term is 17 ; find the series.

7. The sum of three numbers in A.P. is 27, and their product is 504, find them.

8. Determine all pairs (a, b) of real numbers such that 10, a, b, ab are in arithmetic progression.

9. Draw the graphs of

(i) $y = |x + 2| + |x - 3|$ (ii) $y = x + \frac{x}{|x|}$

Solve the following inequalities (10 and 13) :

10. $\left|\frac{2x-1}{x-1}\right| > 2$

11. $|x - 1| + |x - 2| + |x - 3| \geq 6$

12. $\log_2 |x| < 3$

13. $\left|\log_3 x\right| < 2$

14. Draw the graph of the function $y = |2 - |x - 2||$.

15. Make the following expressions free from modulus sign : ($x \in R$)

(i) $|x^2 - 3x - 4|$ (ii) $|x^2 - 7x + 10|$ if $x < 5$

DPP No. # B15 (JEE–ADVANCED)

Total Marks : 25	**Max. Time : 24 min.**
Comprehension ('–1' negative marking) Q.1 to Q.3	**(3 marks 3 min.) [09, 09]**
Single choice Objective ('-1' negative marking) Q.4 to Q.6	**(3 marks 3 min.) [09, 09]**
Multiple choice objective ('-2' negative & Partial marking) Q.7	**(4 marks 3 min.) [04, 03]**
Single Integer Questions ('-1' negative marking) Q.8	**(3 marks 3 min.) [03, 03]**

Question No.	1	2	3	4	5	6	7	8	Total
Marks Obtained									

Comprehension # 1 (Q.No. 1 to 3)

Consider the equation $p = 5 - |2q - 3|$

1. Greatest set of all possible values of p for $q \in R$ is

(A) $(-\infty, 5]$ (B) $(-\infty, 5)$ (C) $(-5, 5)$ (D) None of these

2. If p = 4 then possible values of q are

(A) 2, 1, – 1 (B) –1, 1 only (C) 1 only (D) 2, 1 only

3. If $p = |r| + 5$, then number of possible ordered pair (r, q) is/are

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

4. Total number of values of ' x ' satisfying the equation, $2^{\cos 2x} = 3 \cdot 2^{\cos^2 x} - 4$ and the inequality $x^2 \leq 30$ is :

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

5. 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

6. $\tan^2\frac{\pi}{16} + \tan^2\frac{2\pi}{16} + \tan^2\frac{3\pi}{16} + \tan^2\frac{5\pi}{16} + \tan^2\frac{6\pi}{16} + \tan^2\frac{7\pi}{16}$ is equal to

(A) 24 (B) 34 (C) 44 (D) None of these

7. Consider $S_n = \frac{1}{3^2+1} + \frac{1}{4^2+2} + \frac{1}{5^2+3} + \frac{1}{6^2+4}$ ..... upto n terms then

(A) general term of the series is $t_n = \frac{1}{n^2+5n+4}$

(B) general term of the series is $t_n = \frac{1}{n^2-5n+4}$

(C) $S_\infty = \frac{13}{36}$

(D) $S_\infty = \frac{15}{36}$

8. If $y = x^3 - 3x + 2$, then draw the graph of the followings

(i) $y = |x^3 - 3x + 2|$ (ii) $y = |x|^3 - 3|x| + 2$

(iii) $y = -|x|^3 + 3|x| + 2$ (iv) $|y| = x^3 - 3x + 2$

DPP No. # B16 (JEE–ADVANCED)

Total Marks : 26 **Max. Time : 24 min.**

Single choice Objective ('-1' negative marking) Q.1 to Q.5 **(3 marks 3 min.) [15, 15]**

Multiple choice objective ('-2' negative & Partial marking) Q.6 to Q.7 **(4 marks 3 min.) [08, 06]**

Single Integer Questions ('-1' negative marking) Q.8 **(3 marks 3 min.) [03, 03]**

Question No.	1	2	3	4	5	6	7	8	Total
Marks Obtained									

1. The sum $\sum_{i=0}^{m} \binom{10}{i}\binom{20}{m-i}$, (where $\binom{p}{q} = 0$, if $p < q$) is maximum when ' m ' is

(A) 5 (B) 10 (C) 15 (D) 20

2. Co-efficient of α^t in the expansion of,

$(\alpha + p)^{m-1} + (\alpha + p)^{m-2}(\alpha + q) + (\alpha + p)^{m-3}(\alpha + q)^2 + ... (\alpha + q)^{m-1}$, where $\alpha \neq -q$ and $p \neq q$ is

(A) $\frac{{}^mC_t\left(p^t - q^t\right)}{p-q}$ (B) $\frac{{}^mC_t\left(p^{m-t} - q^{m-t}\right)}{p-q}$ (C) $\frac{{}^mC_t\left(p^t + q^t\right)}{p-q}$ (D) $\frac{{}^mC_t\left(p^{m-t} + q^{m-t}\right)}{p-q}$

3. The sum of the series ${}^{20}C_0 - {}^{20}C_1 + {}^{20}C_2 - {}^{20}C_3 + ... + {}^{20}C_{10}$ is

(A) $-{}^{20}C_{10}$ (B) $\frac{1}{2}{}^{20}C_{10}$ (C) 0 (D) ${}^{20}C_{10}$

4. The term independent of x in the expansion of $\left(x - \frac{1}{x}\right)^4 \left(x + \frac{1}{x}\right)^3$ is:

(A) – 3 (B) 0 (C) 1 (D) 3

5. The co-efficient of x^{n-2} in the polynomial (x – 1) (x – 2) (x – 3) ..... (x – n) is :

(A) $\frac{n(n^2+2)(3n+1)}{24}$ (B) $\frac{n(n^2-1)(3n+2)}{24}$

(C) $\frac{n(n^2+1)(3n+4)}{24}$ (D) none of these

6. If α, β are the roots of the equation $x^2 + \alpha x + \beta = 0$ such that $\alpha \neq \beta$ and $||x - \beta| - \alpha| < \alpha$, then

(A) inequality is satisfied by exactly two integral values of x

(B) inequality is satisfied by all values of $x \in (-4, -2)$

(C) Roots of the equation are opposite in sign

(D) $x^2 + \alpha x + \beta < 0 \ \forall \ x \in [-1, 0]$

7. Consider the equation : $x^2 + 18x + 30 = 2\sqrt{x^2 + 18x + 45}$.

(A) Product of real root of the equation is 10

(B) Product of real root of the equation is 20

(C) Sum of real roots of the equation is –18

(D) Sum of real roots of the equation is 18

8. If $x^2 + x = 1 - y^2$, where x > 0, y > 0, then find the maximum value of $x\sqrt{y}$.

DPP No. # B17 (JEE–ADVANCED)

Total Marks : 24 **Max. Time : 24 min.**

Comprehension ('–1' negative marking) Q.1 to Q.3 **(3 marks 3 min.) [09, 09]**

Single choice Objective ('-1' negative marking) Q.4 to Q.6 **(3 marks 3 min.) [09, 09]**

Single Integer Questions ('-1' negative marking) Q.7 to Q.8 **(3 marks 3 min.) [06, 06]**

Question No.	1	2	3	4	5	6	7	8	Total
Marks Obtained									

Comprehension # 2 (Q.No. 4 to 6)

Consider the equation $2^{|x+1|} - 2^x = |2^x - 1| + 1$

1. The least value of x satisfying the equation is

(A) 0 (B) 2 (C) 4 (D) –2

2. Number of integers less than 15 satisfying the equation are

(A) 14 (B) 15 (C) 16 (D) 17

3. Number of composite numbers less than 20 which are coprime with 4 satisfying the given equation is/ are

(A) 2 (B) 3 (C) 4 (D) 5

4. The remainder obtained when $\lfloor 1 + \lfloor 2 + \lfloor 3 + ... + \lfloor 200$ is divided by 14 is

(A) 3 (B) 4 (C) 5 (D) None of these

5. If $\sum_{r=1}^{N} (r^2 + 2r + 1).\ r! = (2014)! - 2$, then N can be

(A) 2012 (B) 2013 (C) 2011 (D) 2014

6. The number of non-zero terms in the expansion of $(1 + 3\sqrt{2}x)^9 + (1 - 3\sqrt{2}x)^9$ is
(A) 9 (B) 0 (C) 5 (D) 10

7. If n^{th} term of the series $3\frac{1}{3}, 2, 1\frac{3}{7}, 1\frac{1}{9}, \ldots\ldots$ is $\frac{an+10}{bn+c}$, $\forall\ n \in N$, then find the value of $(a + b + c)$

8. If $\sqrt{1+\frac{1}{1^2}+\frac{1}{2^2}} + \sqrt{1+\frac{1}{2^2}+\frac{1}{3^2}} + \sqrt{1+\frac{1}{3^2}+\frac{1}{4^2}} + \ldots\ldots + \sqrt{1+\frac{1}{(1999)^2}+\frac{1}{(2000)^2}} = x - \frac{1}{x}$, then find the value of x

DPP No. # B18 (JEE–ADVANCED)

Total Marks : 29 **Max. Time : 24 min.**
Single choice Objective ('-1' negative marking) Q.1 to Q.3 **(3 marks 3 min.) [09, 09]**
Multiple choice objective ('-2' negative & Partial marking) Q.4 to Q.8 **(4 marks 3 min.) [20, 15]**

Question No.	1	2	3	4	5	6	7	8	Total
Marks Obtained									

1. In the expansion of $(7^{1/3} + 11^{1/9})^{6561}$, the number of terms free from radicals is:
(A) 730 (B) 729 (C) 725 (D) 750

2. The coefficient of the middle term in the binomial expansion in powers of x of $(1 + \alpha x)^4$ and of $(1 - \alpha x)^6$ is the same, if α equals :
(A) $-\frac{5}{3}$ (B) $\frac{10}{3}$ (C) $-\frac{3}{10}$ (D) $\frac{3}{5}$

3. If the coefficients of r^{th}, $(r + 1)^{th}$ and $(r + 2)^{th}$ terms in the binomial expansion of $(1 + y)^m$ are in AP, then m and r satisfy the equation :
(A) $m^2 - m(4r - 1) + 4r^2 + 2 = 0$. (B) $m^2 - m(4r + 1) + 4r^2 - 2 = 0$.
(C) $m^2 - m(4r + 1) + 4r^2 + 2 = 0$. (D) $m^2 - m(4r - 1) + 4r^2 - 2 = 0$.

4. Difference of squares of two distinct odd natural numbers is always a multiple of.
(A) 4 (B) 3 (C) 6 (D) 8

5. If P and Q are sum and product respectively of all real values of x satisfying the equation $|4 - |x - 2|| = 3$, then
(A) $|P| + |Q| = 143$ (B) $|P| + |Q| = 127$ (C) $|P + Q| = 127$ (D) $|P| + |Q| = 142$

6. The set of all values of 'x which satisfies the inequation $\left| 1 - \frac{|x|}{1 + |x|} \right| \geq \frac{1}{2}$ belongs to
(A) $[-1, 1]$ (B) $(-\infty, -1]$ (C) $[1, \infty)$ (D) $[-1, 2]$

7. The value of x satisfying
$2\log_{\frac{1}{4}}(x+5) > \frac{9}{4}\log_{\frac{1}{3\sqrt{3}}}(9) + \log_{\sqrt{x+5}}(2)$ is/are
(A) (–5, –4) (B) (–3, –1) (C) (–4, –1) (D) (–5, –2)

8. The simultaneous equations, $y = x + 2|x|$ & $y = 4 + x - |x|$ have the solution set given by :
(A) $\left(\frac{4}{3}, \frac{4}{3}\right)$ (B) $\left(4, \frac{4}{3}\right)$ (C) $\left(-\frac{4}{3}, \frac{4}{3}\right)$ (D) $\left(\frac{4}{3}, 4\right)$

DPP No. # B19 (JEE– MAIN)

Total Marks : 45 **Max. Time : 45 min.**
Single choice Objective ('-1' negative marking) Q.1 to Q.10 **(3 marks 3 min.) [30, 30]**
Single Integer Questions ('-1' negative marking) Q.11 to Q.15 **(3 marks 3 min.) [15, 15]**

Question No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Marks Obtained																

1. The number of times the digit 3 will be written when listing the integers from 1 to 1000 is:
(A) 300 (B) 269 (C) 271 (D) 302

2. If 'm' denotes the number of 5 digit numbers when each successive digits are in their descending order of magnitude and 'n' is the corresponding figure when the digits are in their ascending order of magnitude, then (m – n) has the value
(A) 2. $^{10}C_5$ (B) $^{10}C_4$ (C) $^{9}C_3$ (D) $^{9}C_5$

3. Number of 4 digit positive integers if the product of their digits is divisible by 3, is
(A) 2700 (B) 6628 (C) 7704 (D) 5464

4. Let the co-efficients of x^n in $(1 + x)^{2n}$ & $(1 + x)^{2n-1}$ be P & Q respectively, then $\left(\frac{P + Q}{Q}\right)^5$ =
(A) 9 (B) 27 (C) 81 (D) none of these

5. The total number of distinct terms in the expansion of, $(x + a)^{100} + (x - a)^{100}$ after simplification is :
(A) 50 (B) 202 (C) 51 (D) none of these

6. The value of m, for which the coefficients of the $(2m + 1)^{th}$ and $(4m + 5)^{th}$ terms in the expansion of $(1 + x)^{10}$ are equal, is
(A) 3 (B) 1 (C) 5 (D) 8

7. **STATEMENT - 1 :** If n is even, then $^{2n}C_1 + {}^{2n}C_3 + {}^{2n}C_5 + \ldots\ldots + {}^{2n}C_{n-1} = 2^{2n-1}$.
STATEMENT - 2 : $^{2n}C_1 + {}^{2n}C_3 + {}^{2n}C_5 + \ldots\ldots + {}^{2n}C_{2n-1} = 2^{2n-1}$.
(A) STATEMENT-1 is true, STATEMENT-2 is true and STATEMENT-2 is correct explanation for STATEMENT-1
(B) STATEMENT-1 is true, STATEMENT-2 is true and STATEMENT-2 is not correct explanation for STATEMENT-1
(C) STATEMENT-1 is true, STATEMENT-2 is false
(D) STATEMENT-1 is false, STATEMENT-2 is true
(E) Both STATEMENTS are false

8. For some natural N, the number of positive integral 'x' satisfying the equation
$1! + 2! + 3! + \ldots\ldots + x! = (N)^2$ is
(A) one (B) two (C) three (D) None of these

9. Sum of the last 30 coefficients in the expansion of $(1 + x)^{59}$, when expanded in ascending powers of x, is
(A) 2^{29} (B) 2^{28} (C) $^{60}C_{30} - 2^{19}$ (D) 2^{58}

10. Coefficient of x^{48} in $\sum_{r=0}^{50} {}^{50}C_r \cdot (x-2)^r \cdot 3^{50-r}$, is
(A) $^{50}C_2$ (B) $^{48}C_2$ (C) 3^{48} (D) none of these

11. Solve the following equations :
(i) $|x - 2| = \sqrt{x-4}$ (ii) $\frac{|x-2|}{x-1} = \frac{1}{x-1}$

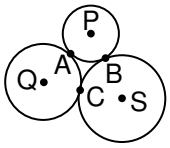
12. $\left|x^2-4x+4\right| \geq 1$

13. Solve the following inequations

(i) $\frac{3}{x-2}<1$ (ii) $\frac{2x-1}{x^2} \geq 1$ (iii) $\frac{x^2-7|x|+10}{x^2-6x+9}<0$

14. If $\sum_{i=1}^{7} i^2 x_i = 1$ and $\sum_{i=1}^{7}(i+1)^2 x_i = 12$ and $\sum_{i=1}^{7}(i+2)^2 x_i = 123$ then find the value of $\sum_{i=1}^{7}(i+3)^2 x_i$

15. Circles with centres P, Q & S are touching each other externally as shown in the figure at points A, B & C . If the radii of circles with centres P, Q & S are 1, 2 and 3 respectively then the length of chord AB is _____



DPP No. # B20 (JEE–ADVANCED)

Total Marks : 29	**Max. Time : 29 min.**
Comprehension ('–1' negative marking) Q.1 to Q.3	**(3 marks 3 min.) [09, 09]**
Single choice Objective ('-1' negative marking) Q.4 to Q.6	**(3 marks 3 min.) [09, 09]**
Single Integer Questions ('-1' negative marking) Q.7	**(3 marks 3 min.) [03, 03]**
Match the Following (each row '(2, -1)' negative marking) Q.8	**(8 marks, 8 min.) [08, 08]**

Question No.	1	2	3	4	5	6	7	8	Total
Marks Obtained									

Comprehension # 3 (6 to 8)

Let $P = \sum_{r=1}^{50} \frac{^{50+r}C_r(2r-1)}{^{50}C_r(50+r)}$, $Q = \sum_{r=0}^{50}\left(^{50}C_r\right)^2$, $R = \sum_{r=0}^{100}(-1)^r(^{100}C_r)^2$

1. The value of (P – Q) is equal to
(A) 1 (B) –1 (C) 2^{50} (D) 2^{100}

2. The value of (P – R) is equal to
(A) 1 (B) –1 (C) 2^{50} (D) 2^{100}

3. The value of (Q + R) is equal to
(A) 2P + 1 (B) 2P – 1 (C) 2P + 2 (D) 2P – 2

4. The sum $\sum_{r=0}^{n}(r+1)\,C_r^2$ is equal to :

(A) $\frac{(n+2)(2n-1)!}{n!\,(n-1)!}$ (B) $\frac{(n+2)(2n+1)!}{n!(n-1)!}$ (C) $\frac{(n+2)(2n+1)!}{n!(n+1)!}$ (D) $\frac{(n+2)(2n-1)!}{n!\,(n+1)!}$

5. In the binomial expansion of $(a-b)^n$, $n \geq 5$, the sum of the 5th and 6th terms is zero. Then a/b equals:
(A) $\frac{n-5}{6}$ (B) $\frac{n-4}{5}$ (C) $\frac{5}{n-4}$ (D) $\frac{6}{n-5}$

6. If x is positive, the first negative term in the expansion of $(1+x)^{\frac{27}{5}}$ is :

(A) 7th term (B) 5th term (C) 8th term (D) 6th term.

7. If n is any positive integer, then find the number whose square is $\underbrace{111.....1}_{2n \text{ times}} - \underbrace{222.....2}_{n \text{ times}}$

8.

	Column-I	Column-II
(A)	Number of real solutions of the equation $\lvert x-1\rvert + \lvert x-3\rvert = \frac{3}{2}$ is	(P) – 1
(B)	If $\sin x + \sin^2 x = 1$ then the value of $\cos^2 x + \cos^4 x$ equals	(Q) 0
(C)	If $\log_{10}(x^2+x) = \log_{10}(x^3-x)$ then the product of all solutions of the equation is	(R) 1
(D)	If $1 + x + x^2 + x^3 = 0$ where $x \in R$ then the value of $1 + x + x^2 + x^3 + x^4 + ...+ x^{2008} + x^{2009}$ equals	(S) 2

DPP No. # B21 (JEE–ADVANCED)
Special DPP on Binomial Theorem and Fundamental of Mathematics-II

Total Marks : 52 **Max. Time : 45 min.**
Single choice Objective ('-1' negative marking) Q.1 to Q.5 **(3 marks 3 min.) [15, 15]**
Multiple choice objective ('-2' negative & Partial marking) Q.6 to Q.12 **(4 marks 3 min.) [28, 21]**
Single Integer Questions ('-1' negative marking) Q.13 to Q.15 **(3 marks 3 min.) [09, 09]**

Question No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Marks Obtained																

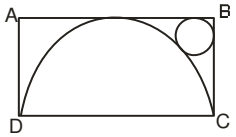
1. If $\sum_{r=0}^{n} (-1)^r . {}^nC_r \left[\frac{1}{2^r} + \frac{3^r}{2^{2r}} + \frac{7^r}{2^{3r}} + ...\text{to m terms}\right] = k\left(1 - \frac{1}{2^{mn}}\right)$, then k =

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

2. The expression $\frac{1}{\sqrt{4x+1}}\left[\left[\frac{1+\sqrt{4x+1}}{2}\right]^7 - \left[\frac{1-\sqrt{4x+1}}{2}\right]^7\right]$ is a polynomial in x of degree

(A) 7 (B) 6 (C) 4 (D) 3

3. The figure shows a rectangle ABCD with a semi-circle and a circle inscribed inside it as shown. What is the ratio of the area of the circle to that of the semi-circle?



(A) $(\sqrt{2}-1)^2$ (B) $2(\sqrt{2}-1)^2$ (C) $(\sqrt{2}-1)^2/2$ (D) $2(\sqrt{2}-1)^4$

4. If $\sum_{r=0}^{2n} a_r (x-1)^r = \sum_{r=0}^{2n} b_r (x-2)^r$ and $b_r = (-1)^{r-n}$ for all $r \geq n$, then a_n =

(A) ${}^{2n+1}C_{n-1}$ (B) ${}^{3n}C_n$ (C) ${}^{2n+1}C_n$ (D) 0

5. p is a prime number and $n < p < 2n$. If $N = {}^{2n}C_n$, then
(A) p divides N (B) p^2 divides N (C) p cannot divides N (D) None of these

6. The sum of the greatest and the smallest terms in $(x + 12)^{21}$ is zero then x can take values.
(A) –10 (B) –21 (C) –28 (D) –6

7. The continued product 2.6.10.14 ..... to n factors is equal to
(A) ${}^{2n}P_n$ (B) ${}^{2n}C_n$
(C) (n + 1) (n + 2)(n + 3) .....(n + n) (D) 2^n . (1.3.5.....2n – 1)

8. The soltuion of $| x^2 + 3x | + x^2 - 2 \geq 0$ is :
(A) $(-\infty, 1)$ (B) (0, 1) (C) $\left(-\infty, -\frac{2}{3}\right]$ (D) $\left[\frac{1}{2}, \infty\right)$

9. Which of the following equations have no real solutions ?
(A) $x^2 - 2x + 5 + \pi^x = 0$ (B) $\log_{1.5}(\cot^{-1}x - \text{sgn}(e^x)) = 2$
(C) $x^4 - 2x^2\sin^2\frac{\pi x}{2} + 1 = 0$ (D) all of these

10. The solution set satisfying the inequality, $\frac{\sqrt{21 - 4a - a^2}}{a + 1} \leq 1$ contains :
(A) [– 7, – 1) (B) [2, 3] (C) [2, ∞) (D) [– 7, 0)

11. The co–efficient of x^4 in the expansion of $(1 - x + 2x^2)^{12}$ is:
(A) ${}^{12}C_3$ (B) ${}^{13}C_3$ (C) ${}^{12}C_8 + 4{}^{12}C_{10} + 6\,{}^{12}C_9$ (D) ${}^{12}C_3 + 3\,{}^{13}C_3 + {}^{14}C_4$

12. If $(1 + x)^n = C_0 + C_1x + C_2x^2 + ... + C_nx^n$, $m \geq 2$
$C_0 - C_1 + C_2 - ..... + (-1)^{m-1}C_{m-1} = (-1)^{m-1\ n-1}C_{m-1}$.
(A) $(-1)^{m-1\ n-1}C_{m-1}$ (B) $(-1)^{m-1\ n}C_{m-1}$ (C) $(-1)^{m-1\ n-1}C_{n-m}$ (D) $(1)^{m-1\ n}C_{n-m}$

13. Solve the equation :

$|x+1| - |x| + 3|x-1| - 2|x-2| = x+2$

Solve the following (Q. 14-15)

14. $| (x^2 + 2x + 2) + (3x + 7) | < | x^2 + 2x + 2 | + | 3x + 7 |$

15. $| x^2 - 1 | + | x^2 - 4 | \leq 3$

DPP No. # B22 (JEE–ADVANCED)

Total Marks : 29 **Max. Time : 29 min.**
Single choice Objective ('-1' negative marking) Q.1 to Q.7 **(3 marks 3 min.) [21, 21]**
Match the Following (each row '(2, -1)' negative marking) Q.8 **(8 marks, 8 min.) [08, 08]**

Question No.	1	2	3	4	5	6	7	8	Total
Marks Obtained									

1. Number of non-empty subsets of {1, 2, 3, 4, 5, 6, 7, 8} having exaclty k elements and do not contain the element k for some k = 1, 2,.....,8 is
(A) 63 (B) 255 (C) 127 (D) 31

2. If the expansion in powers of x of the function $\frac{1}{(1-ax)\ (1-bx)}$ is $a_0 + a_1x + a_2x^2 + a_3x^3 + ...$, then a_n is :

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

3. If x is so small that x^3 and higher powers of x may be neglected, then $\frac{(1+x)^{3/2} - \left(1+\frac{1}{2}x\right)^3}{(1-x)^{1/2}}$ may be approximated as :

(A) $\frac{x}{2} - \frac{3}{8}x^2$ (B) $-\frac{3}{8}x^2$ (C) $3x + \frac{3}{8}x^2$ (D) $1 - \frac{3}{8}x^2$

4. The sum of the series $\sum_{r=1}^{n}(-1)^{r-1}.{}^nC_r(a-r)$, n>1 is equal to :

(A) n . 2^{n-1} + a (B) 0 (C) a (D) None of these

5. $\sum_{k=1}^{360}\left(\frac{1}{k\sqrt{k+1}+(k+1)\sqrt{k}}\right)$ is the ratio of two relative prime positive integers m and n. The value of (m + n) is equal to

(A) 43 (B) 41 (C) 39 (D) 37

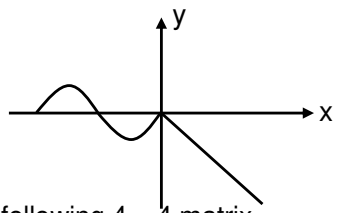
6. Number of ways in which 3 tickets can be selected from a set of 500 tickets numbered 1, 2, 3, ..., 500 so that the number on them are in arithmetic progression is

(A) 500 (B) ${}^{500}C_3$ (C) 62250 (D) None of these

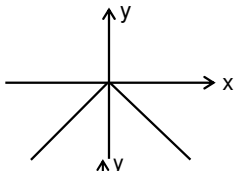
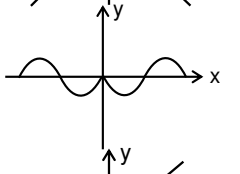
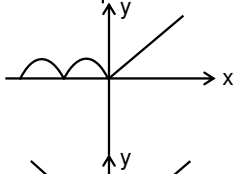
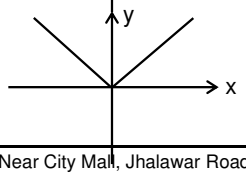
7. Sum of all the 4-digit numbers which can be formed using the digits 0, 3, 6, 9 (without repetition of digits) is

(A) 119988 (B) 115992 (C) 3996 (D) None of these

8. If y = f(x) has following graph



Match the column by filling the following 4 × 4 matrix

(A)	y = |f(x)|	(p)	
(B)	y = f(|x|)	(q)	
(C)	y = f(– |x|)	(r)	
(D)	y = | f (|x|) |	(s)	

DPP No. # B23 (JEE–ADVANCED)

Total Marks : 34 **Max. Time : 34 min.**
Single choice Objective ('-1' negative marking) Q.1 to Q.5 **(3 marks 3 min.) [15, 15]**
Single Integer Questions ('-1' negative marking) Q.6 **(3 marks 3 min.) [03, 03]**
Match the Following (each row '(2, -1)' negative marking)Q.7 to Q.8 **(8 marks, 8 min.) [16, 16]**

Question No.	1	2	3	4	5	6	7	8	Total
Marks Obtained									

1. If the quadratic polynomials defined on real coefficients
$P(x) = a_1x^2 + 2b_1x + c_1$ and $Q(x) = a_2x^2 + 2b_2x + c_2$
take positive values $\forall\ x \in R$. What can we say for the trinomial $g(x) = a_1a_2x^2 + b_1b_2x + c_1c_2$?
(A) g(x) takes positive values only (B) g(x) takes negative values only
(C) g(x) can take positive as well as negative values (D) nothing definite can be said about g(x)

2. The exponent of 12 in 100! is
(A) 97 (B) 58 (C) 48 (D) None of these

3. Number of words each consisting of two vowels and two consonants which can be made out of the letters of the word 'DEVASTATION' is
(A) 126 (B) 198 (C) 1512 (D) 1638

4. The number of zeroes at the end of 70! is
(A) 16 (B) 15 (C) 14 (D) 20

5. The coefficient of x^5 in $(1 + 2x + 3x^2 + ...)^{-3/2}$ is :
(A) 21 (B) 25 (C) 26 (D) none of these

6. It is known for $x \neq 1$ that $1 + x + x^2 + ...+x^{n-1} = \frac{1-x^n}{1-x}$, hence find the sum of the series $S = 1 + 2x + 3x^2 + ...+ (n + 1)\ x^n$.

7. **Match the followings :**

	Column - I		**Column - II**
(A)	If x = 3, then $\log_4 (2 \log_3 (1 + \log_2 (1 + 3 \log_3 x)))$ is equal to	(p)	3
(B)	If x = 100, then $3^{\log_3 \log \sqrt{x}} - \log x + \log^2 x$ is equal to (base of log is 10)	(q)	1
(C)	If one of the root of the equation $2(\log_x \sqrt{5})^2 - 3 \log_x (a) + 1 = 0$ is $\sqrt{5}$, then the other root is	(r)	$\frac{1}{2}$
(D)	If $\log_2 (4.3^x - 6) - \log_2 (9^x - 6) = 1$, then x is equal to	(s)	5

8. **Match the column**

	Column – I	**Column – II**	
(A)	Area of the region enclosed by $2\|x\| + 3\|y\| \leq 6$ is	(p)	12
(B)	OPQR is a square and M, N are the mid points of the sides PQ and QR respectively. If the ratio of the areas of the square and the triangle OMN is $\lambda : 6$, then λ is equal to	(q)	2
(C)	If slope of the straight line through the point (1, 2), whose distance from the point (3, 1) has the greatest value, is $\frac{m}{6}$, then m is equal to	(r)	4
(D)	Area of ΔABC is 20 sq. units where points A, B and C are (4, 6), (10, 14) and (x, y) respectively. If AC is perpendicular to BC, then number of positions of C is	(s)	16

DPP No. # B24 (JEE– MAIN)

Total Marks : 45 **Max. Time : 45 min.**
Single choice Objective ('-1' negative marking) Q.1 to Q.15 **(3 marks 3 min.) [45, 45]**

Question No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Marks Obtained																

1. All possible three digit even numbers which can be formed with the condition that if 5 is one of the digit, then 7 is the next digit, is
(A) 5 (B) 325 (C) 345 (D) 365

2. A number of different seven digit numbers that can be written using only three digits 1, 2 & 3 under the condition that the digit 2 occurs exactly twice in each number, is
(A) 640 (B) 672 (C) 512 (D) none of these

3. Number of natural numbers between 100 & 1000 such that at least one of their digits is 6, is
(A) 251 (B) 243 (C) 258 (D) 252

4. A class contains 4 boys and g girls. Every sunday five students, including at least three boys go for a picnic to Appu Ghar, a different group being sent every week. During, the picnic, the class teacher gives a doll to each girl in the group. If the total number of dolls distributed was 85, then value of g is
(A) 15 (B) 12 (C) 8 (D) 5

5. Let A,B,C,D be collinear points in that order. Suppose AB : CD = 3 : 2 and BC : AD = 1 : 5. Then AC : BD is
(A) 1 : 1 (B) 11 : 10 (C) 16 : 11 (D) 17 : 13

6. If A & B are the points $(-3, 4)$ and (2, 1), then the co–ordinates of the point C on AB produced such that $AC = 2\,BC$ are :
(A) (2, 4) (B) (3, 7) (C) (7, –2) (D) $\left(-\frac{1}{2}, \frac{5}{2}\right)$

7. If in triangle ABC , $A \equiv (1, 10)$, circumcentre $\equiv \left(-\frac{1}{3}, \frac{2}{3}\right)$ and orthocentre $\equiv \left(\frac{11}{3}, \frac{4}{3}\right)$ then the co-ordinates of mid-point of side opposite to A is :
(A) $(1, -11/3)$ (B) (1, 5) (C) $(1, -3)$ (D) (1, 6)

8. If the 6th term in the expansion of $\left[\frac{1}{x^{8/3}} + x^2 \log_{10} x\right]^8$ is 5600, then x =

(A) 10 (B) 8 (C) 11 (D) 9

9. If the second term of the expansion $\left[a^{1/13} + \frac{a}{\sqrt{a^{-1}}}\right]^n$ is $14a^{5/2}$, then the value of $\frac{{}^nC_3}{{}^nC_2}$ is:

(A) 4 (B) 3 (C) 12 (D) 6

10. The co-efficient of x in the expansion of $(1 - 2x^3 + 3x^5)\left(1 + \frac{1}{x}\right)^8$ is :

(A) 56 (B) 65 (C) 154 (D) 62

11. If $(1!)^2 + (2!)^2 + (3!)^2 + ... + (99!)^2 + (100!)^2$ is divided by 100, the remainder is

(A) 27 (B) 28 (C) 17 (D) 14

12. The coefficients of three consecutive terms of $(1 + x)^{n+5}$ are in the ratio 5 : 10 : 14. Then n =

(A) 4 (B) 5 (C) 6 (D) 7

13. **STATEMENT - 1 :** The term independent of x in the expansion of $\left(x + \frac{1}{x} + 2\right)^m$ is $\frac{(2m)\ !}{(m\ !)^2}$

STATEMENT - 2 : The coefficient of x^b in the expansion of $(1 + x)^n$ is ${}^nC_b$.

(A) STATEMENT-1 is true, STATEMENT-2 is true and STATEMENT-2 is correct explanation for STATEMENT-1

(B) STATEMENT-1 is true, STATEMENT-2 is true and STATEMENT-2 is not correct explanation for STATEMENT-1

(C) STATEMENT-1 is true, STATEMENT-2 is false

(D) STATEMENT-1 is false, STATEMENT-2 is true

(E) Both STATEMENTS are false

14. If both roots of $x^2 - 2ax + a^2 + a - 3 = 0$ are less than 3, then :

(A) $a < 2$ (B) $2 \le a \le 3$ (C) $3 < a \le 4$ (D) $a > 4$

15. If letters of the word "PARKAR" are written down in all possible manner as they are in a dictionary, then the rank of the word 'PARKAR' is

(A) 98 (B) 99 (C) 100 (D) 101

DPP No. # B25 (JEE–ADVANCED)

Total Marks : 28 **Max. Time : 24 min.**
Single choice Objective ('-1' negative marking) Q.1 to Q.4 **(3 marks 3 min.) [12, 12]**
Multiple choice objective ('-2' negative & Partial marking) Q.5 to Q.8 **(4 marks 3 min.) [16, 12]**

Question No.	1	2	3	4	5	6	7	8	Total
Marks Obtained									

1. Number of different ways in which 8 different books can be distributed among 3 students, if each student receives at least 2 books is

(A) 2940 (B) 2600 (C) 2409 (D) 2446

2. Let N be the number of quadratic equations with coefficients from {0, 1, 2, 3...., 9} such that 0 is a solution of each equation. Then the value of N is

(A) 2^9 (B) infinite (C) 90 (D) 900

3. If the line y = x cuts the curve $x^3 + 3y^3 - 30xy + 72x - 55 = 0$ in points A, B and C, then the value of $\frac{4\sqrt{2}}{55}$ OA.OB.OC (where O is the origin), is

(A) 55 (B) $\frac{1}{4\sqrt{2}}$ (C) 2 (D) 4

4. The angle bisectors of angle A for the triangle ABC whose coordinates of the vertices are A(–8, 5) ; B(–15, –19) and C(1, –7) has the equations

(A) 11 x + 2y + 3 = 0 (B) 2x – 11y + 71 = 0

(C) 11x + 2y + 78 = 0 (D) 2x – 11y + 7 = 0

5. The vertices of a triangle are $A(x_1, x_1 \tan\alpha)$, $B(x_2, x_2 \tan\beta)$ and $C(x_3, x_3 \tan\gamma)$. If the circumcentre of triangle ABC coincides with the origin and H(a, b) be the orthocentre, then $\frac{a}{b}$ =

(A) $\frac{x_1 + x_2 + x_3}{x_1\tan\alpha + x_2\tan\beta + x_3\tan\gamma}$ (B) $\frac{x_1\cos\alpha + x_2\cos\beta + x_3\cos\gamma}{x_1\sin\alpha + x_2\sin\beta + x_3\sin\gamma}$

(C) $\frac{\tan\alpha + \tan\beta + \tan\gamma}{\tan\alpha.\tan\beta.\tan\gamma}$ (D) $\frac{\cos\alpha + \cos\beta + \cos\gamma}{\sin\alpha + \sin\beta + \sin\gamma}$

6. The sides of a triangle are the straight lines x + y = 1 ; 7y = x and y + x = 0 . Then which of the following is an interior point of the triangle ?

(A) circumcentre (B) centroid (C) incentre (D) orthocentre

7. If $S_n = \sum_{r=1}^{n} \frac{r}{1.3.5.7.....(2r+1)}$ then

(A) $S_n = \frac{1}{2}\left[1 - \frac{1}{1.3.5.....(2n+1)}\right]$ (B) $S_\infty = \frac{1}{2}$

(C) $\frac{1}{4}\left[1 + \frac{1}{1.3.5.....(2n-1)}\right]$ (D) $S_\infty = \frac{1}{4}$

8. If $\left(3\sqrt{3} + 5\right)^n = p + f$, where p is an integer and f is a proper fraction, then the value of $\left(3\sqrt{3} - 5\right)^n$, $n \in N$ is

(A) 1 – f, if n is even (B) 1 – f, if n is odd (C) f, if n is odd (D) f, if n is even

DPP No. # B26 (JEE–ADVANCED)

Total Marks : 28	**Max. Time : 24 min.**
Comprehension ('–1' negative marking) Q.1 to Q.2	**(3 marks 3 min.) [06, 06]**
Single choice Objective ('-1' negative marking) Q.3 to Q.6	**(3 marks 3 min.) [12, 12]**
Multiple choice objective ('-2' negative & Partial marking) Q.7 to Q.8	**(4 marks 3 min.) [08, 06]**

Question No.	1	2	3	4	5	6	7	8	Total
Marks Obtained									

Comprehension # 1 (1 to 2)

P is a set containing n elements. Subset A of P is chosen and the set P is reconstructed by replacing the elements of A. A subset B of P is chosen again.

1. The number of ways of choosing A and B such that B contains just one element more than A is

(A) 2^n (B) ${}^{2n}C_{n-1}$ (C) ${}^{2n}C_n$ (D) $(3^n)^2$

2. The number of ways of choosing A and B such that B is a subset of A is

(A) ${}^{2n}C_n$ (B) 4^n (C) 3^n (D) None of these

3. For natural numbers m, n if $(1 - y)^m (1 + y)^n = 1 + a_1 y + a_2 y^2 + ...$ and $a_1 = a_2 = 10$, then (m, n) is :
(A) (35, 20) (B) (45, 35) (C) (35, 45) (D) (20, 45)

4. If $s_n = \sum_{r=0}^{n} \frac{1}{{}^nC_r}$ and $t_n = \sum_{r=0}^{n} \frac{r}{{}^nC_r}$, then $\frac{t_n}{s_n}$ is equal to-

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

5. If the equation $x^2 + ax + b = 0$ has distinct real roots and $x^2 + a|x| + b = 0$ has only one real root, then
(A) $b = 0, a > 0$ (B) $b = 0, a < 0$ (C) $b > 0, a < 0$ (D) $b < 0, a > 0$

6. **Statement-1 :** $\sum_{r=0}^{n} (r+1)\ {}^nC_r = (n + 2)\ 2^{n-1}$

Statement-2 : $\sum_{r=0}^{n} (r + 1)\ {}^nC_r\ x^r = (1 + x)^n + nx\ (1 + x)^{n-1}$

(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

7. The number of ways in which four different letters can be put in their four addressed envelopes such that
(A) at least two of them are in the wrong envelopes, are 23
(B) at least two of them are in the wrong envelopes, are 25
(C) exactly two of them are in the wrong envelopes, are 6
(D) exactly two of them are in the wrong envelopes, are 7

8. If N = 6m (where m is obtained in question number 35) then :
(A) total number of divisors of N is 36
(B) total number of divisors of N in form of (2n + 1) is 12 ($n \in$ Natural)
(C) The number of ways in which N can be resolved as product of two factors is 18
(D) The number of ways in which N can be resolved as product of two coprime factors is 8.

DPP No. # B27 (JEE–ADVANCED)

Total Marks : 34	**Max. Time : 29 min.**
Single choice Objective ('-1' negative marking) Q.1	**(3 marks 3 min.) [03, 03]**
Multiple choice objective ('-2' negative & Partial marking) Q.2 to Q.6	**(4 marks 3 min.) [20, 15]**
Single Integer Questions ('-1' negative marking) Q.7	**(3 marks 3 min.) [03, 03]**
Match the Following (each row '(2, -1)' negative marking) Q.8	**(8 marks, 8 min.) [08, 08]**

Question No.	1	2	3	4	5	6	7	8	Total
Marks Obtained									

1. Orthocentre of an acute triangle ABC is at the origin and its circumcentre has the co-ordinates $\left(\frac{1}{2}, -\frac{1}{2}\right)$. If the base BC has the equation $4x - 2y = 5$, then the radius of the circle circumscribing the triangle ABC, is

(A) $\sqrt{\frac{5}{2}}$ (B) $\sqrt{3}$ (C) $\frac{3}{\sqrt{2}}$ (D) $\sqrt{6}$

2. There are 720 permutations of the digits 1, 2, 3, 4, 5, 6 suppose these permutations are arranged from smallest to largest numerical values beginning from 123456 and ending with 654321.
(A) Number falls on the 124^{th} position is 213564
(B) The position of the number 321546 is 267
(C) Number falls on the 124^{th} position is 223564
(D) The position of the number 321546 is 261

3. There all 10 questions, each question is either True or False. Number of diff. sequences of incorrect answers is equal to :
(A) No. of ways in which a normal coin tossed 10 times would fall in a definite order if both heads and tails are present.
(B) No. of ways in which a multiple choice question containing 10 alternatives with one or more than one correct alternatives, can be answered.
(C) No. of ways in which it is possible to draw a sum of money with 10 coins of different donominations taken some or all at time.
(D) No. of different selections of 10 indistinguishable things taken some or all at a time.

4. 5 Indian & 5 American couples meet at a party & shake hands. If no wife shakes hands with her husband & no Indian wife shakes hands with a male, then the number of hand shakes that takes place in the party is m then
(A) m = 135 (B) m is divisible by 5
(C) m is divisible by 7 (D) m is divisible by 3

5. The coefficient of x^4 in $\left(\frac{1+x}{1-x}\right)^2$, $|x| < 1$, is
(A) 4 (B) –4 (C) $10 + {}^4C_2$ (D) 16

6. In the expansion of $(x + y + z)^{25}$
(A) every term is of the form ${}^{25}C_r \cdot {}^rC_k \cdot x^{25-r} \cdot y^{r-k} \cdot z^k$
(B) the coefficient of $x^8 y^9 z^9$ is 0
(C) the number of terms is 325
(D) none of these

7. If $S_1, S_2, S_3, \ldots\ldots, S_{2n}$ are the sums of infinite geometric series whose first terms are respectively 1, 2, 3, ..., 2n and common ratio are respectively,
$\frac{1}{2}, \frac{1}{3}, \ldots\ldots, \frac{1}{2n+1}$, find the value of, $S_1^2 + S_2^2 + \ldots\ldots + S^2_{2n-1}$.

8. **Match the column :**

	Column I	**Column II**
(A)	If x, y, z be positive real numbers such that $\log_{(2x)} z = 3$, $\log_{(5y)} z = 6$ and $\log_{(xy)} z = 2/3$, then the value of z is in the form of m/n in lowest form then (n – m) is equal to	(p) 10
(B)	Let $0 \le a, b, c, d \le \pi$, when b & c are not complementary such that $2\cos a + 6\cos b + 7\cos c + 9\cos d = 0$ and, $2\sin a - 6\sin b + 7\sin c - 9\sin d = 0$ If $\frac{\cos(a+d)}{\cos(b+c)} = \frac{m}{n}$, where m & n are relatively prime positive numbers, then the value of (m + n) is equal to	(q) 6
(C)	The range of values of x for which the equation $x^2 - x + \sin^2\alpha = 0$ have real solutions for all real values of α, is [a, b], then a + b equals	(r) 1
(D)	The value of $64\sqrt{3}\ \sin\frac{\pi}{48}\ \cos\frac{\pi}{48}\ \cos\frac{\pi}{24}\ \cos\frac{\pi}{12}\ \cos\frac{\pi}{6}$, is	(s) 9

ANSWERKEY

DPP No. # B1

11. $\cos\theta = -\frac{5}{13}$, $\tan\theta = \frac{12}{5}$, $\cot\theta = \frac{5}{12}$

15. (i) $\frac{\pi}{6}, \frac{5\pi}{6}$ (ii) $\frac{\pi}{6}, \frac{11\pi}{6}$

(iii) $\frac{\pi}{3}, \frac{4\pi}{3}$ (iv) $\frac{5\pi}{4}, \frac{7\pi}{4}$

(v) $\frac{2\pi}{3}, \frac{4\pi}{3}$ (vi) $\frac{5\pi}{6}, \frac{11\pi}{6}$.

DPP No. # B2

7. 0 **8.** 9

DPP No. # B5

13. (i) 4

(ii) $\begin{cases} -(x^3+8) & \text{if} \quad x < -2 \\ (x^3+8) & \text{if} \quad x \geq -2 \end{cases}$

(iii) $\begin{cases} -3x-2 & , \quad x < -3 \\ -x+4 & , \quad -3 \leq x < 0 \\ x+4 & , \quad 0 \leq x < 1 \\ 3x+2 & , \quad x \geq 1 \end{cases}$

14. (i) $2-\sqrt{3}$

(ii) $-\pi+3+\sqrt{5}-\sqrt{3}$

(iii) $\sqrt[4]{3}-\sqrt[3]{2}$

15. $\frac{125}{14}$

DPP No. # B6

7. $[0, 8/5] \cup [5/2, \infty)$

8. (i) $x = -4, 2$

(ii) No solution

(iii) $x \in [-5, 1]$

DPP No. # B7

8. (i) $[-3, 3]$

(ii) $[-1, 5]$

DPP No. # B8

8. (i) $[1, 3] \cup \{0\}$

(ii) $[-3, -2] \cup [2, 3]$

DPP No. # B9

6. No

7. year 2005

8. $x \in \left[\frac{3}{2}, 2\right)$

9. $x \in \left[\frac{3}{2}, \infty\right)$

11. (i) $x = 2$

(ii) $x = 3$

(iii) $x = 0, 11$

12. False

13. $x = 0, 8$

14. $x = -10, -6, 0, 4$

15. $x = 0, \pm 4, 8$

DPP No. # B10

6. 3, 7, 11, 15, 19, ...

7. 3059

8. $\frac{2007}{2008}$

DPP No. # B11

25. $\frac{\cot 1^\circ}{90}$

26. max = 25, min = –25

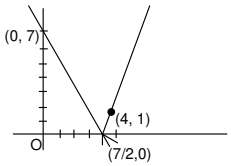
27. max = $\sqrt{13}$, min = $-\sqrt{13}$

28. no Solution

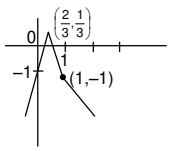
DPP No. # B12

7. 0

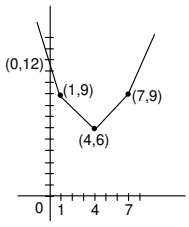
8. **(i)**



(ii)



(iii)



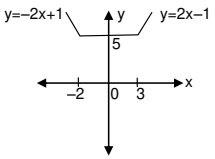
DPP No. # B14

6. 2, 5, 8,.....

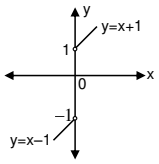
7. 4, 9, 14

8. (4, –2), $\left(\frac{5}{2}, -5\right)$

9. (i)



(ii)



10. $x \in (3/4, 1) \cup (1, \infty)$

11. $x \in (-\infty, 0] \cup [4, \infty)$

12. $x \in (-8, 0) \cup (0, 8)$

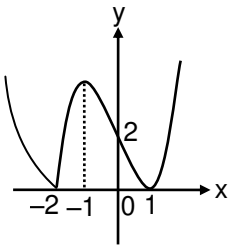
13. $x \in \left(\frac{1}{9}, 9\right)$

15. (i) $\begin{cases} -(x^2-3x-4) & \text{if} \quad x \in (-1, 4) \\ x^2-3x-4 & \text{if} \quad x \in (-\infty, -1] \cup [4, \infty) \end{cases}$

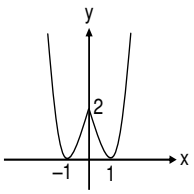
(ii) $\begin{cases} (x^2-7x+10) & \text{if} \quad x \le 2 \\ -(x^2-7x+10) & \text{if} \quad 2 < x < 5 \end{cases}$

DPP No. # B13

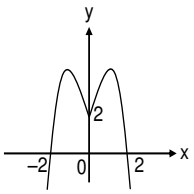
8. (i)



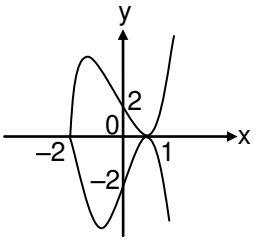
(ii)



(iii)



(iv)



DPP No. # B16

8. $\frac{1}{2\sqrt{2}}$

DPP No. # B17

7. 3

8. $x = 2000, -\frac{1}{2000}$

DPP No. # B19

11. (i) $x \in \phi$

(ii) $x = 3$

12. $x \in (-\infty, 1] \cup [3, \infty)$

13. **(i)** $x \in (-\infty, 2) \cup (5, \infty)$

(ii) $x \in \{1\}$

(iii) $(-5, -2) \cup (2, 3) \cup (3, 5)$

14. 334

15. $\sqrt{2}$

DPP No. # B20

7. $\underbrace{333.....3}_{\text{n times}}$

8. (A) Q; (B) R; (C) S; (D) Q

DPP No. # B21

13. $x \in [2, \infty) \cup \{-2\}$

14. $x < -\frac{7}{3}$

15. $x \in [-2, -1] \cup [1, 2]$

DPP No. # B22

8. (A) $\rightarrow$ (r), (B) $\rightarrow$ (p), (C) $\rightarrow$ (q), (D) $\rightarrow$ (s)

DPP No. # B23

6. $\frac{(n+1)x^{n+2} - (n+2)x^{n+1} + 1}{(1-x)^2}$

7. (A) $\rightarrow$ (r), (B) $\rightarrow$ (p), (C) $\rightarrow$ (s), (D) $\rightarrow$ (q)

8. (A) $\rightarrow$ (p), (B) $\rightarrow$ (s), (C) $\rightarrow$ (p), (D) $\rightarrow$ (r)

DPP No. # B27

7. $\frac{n\ (2n+1)\ (4n+1)}{3} - 1$

8. (A) $\rightarrow$ (s), (B) $\rightarrow$ (p), (C) $\rightarrow$ (r), (D) $\rightarrow$ (q)