Fresher (For Class XII Appering) Target : JEE-(Mains / Advanced)

Time: 30 Min. **DPP : 1** **M.M.: 32**

[SINGLE CORRECT CHOICE TYPE] [8 × 3 = 24]

Q.1 The value(s) of x satisfying the equation $\log_2 x + 2\log_2 x - \log_2(x-1) = 3$, is

(A) $2, -1 \pm \sqrt{5}$ (B) $1, -1 + \sqrt{5}$ (C) $2, -1 + \sqrt{5}$ (D) $-1, -1 + \sqrt{5}$

Q.2 If the equation $\sin 2\theta + \cos 2\theta = p$ has a solution then p **cannot** be

(A) $\frac{-1}{2}$ (B) 0 (C) $\frac{\pi}{4}$ (D) $\frac{\pi}{2}$

Q.3 The number of one element subset, the number of two element subsets and the number of three element subsets of a set containing more than three elements are consecutive terms of an A.P. The number of elements in the set can be,

(A) 2 (B) 5 (C) 7 (D) 9

Q.4 The value of $\sum_{n=1}^{\infty}\left(\frac{4n-2}{3^n}\right)$ is equal to

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

Q.5 The smallest positive integral value of $y = \frac{x^2 + x + 7}{x + 2}$, $x \in R$ is

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

Q.6 Two concentric circles are such that the smaller divides the larger into two regions of equal area. If the radius of the smaller circle is 2, then the length of the tangent from any point 'P' on the larger circle to the smaller circle is :

(A) 1 (B) $\sqrt{2}$ (C) 2 (D) none

Q.7 The most general values of θ which satisfy both the equations $\sqrt{2}\sin\theta + 1 = 0$ and $\tan\theta - 1 = 0$ is

(A) $n\pi + \frac{\pi}{4}$ (B) $2n\pi + \frac{3\pi}{4}$ (C) $2n\pi - \frac{3\pi}{4}$ (D) $n\pi + \frac{3\pi}{4}$

(where $n \in I$)

Q.8 The area bounded by the curves $y = |x| - 1$ and $y = -|x| + 1$ is

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

[JEE 2002 (Screening)]

Fresher (For Class XII Appering) Target : JEE-(Mains / Advanced)

DPP : 2

[MULTIPLE CORRECT CHOICE TYPE] [5 × 4 = 20]

Q.1 The possible integral value(s) of $f(x) = \dfrac{(x-2)^8 + 4(x-2)^7 + (x-2)^6 + 1}{(x-2)^6}$ $\forall\ x > 2$, is

(A) 1 (B) 2 (C) 7 (D) 8

Q.2 The vertex A of triangle ABC is at origin. The equation of medians through B and C are $15x - 4y = 240$ and $15x - 52y + 240 = 0$ respectively. Then

(A) the incentre of triangle ABC is (12, 21) (B) the incentre of triangle ABC is (21, 12)

(C) the orthocentre of triangle ABC is (0, 63) (D) the orthocentre of triangle ABC is (63, 0)

Q.3 There are 10 seats in the first row of a theatre of which 4 are to be occupied . The number of ways of arranging 4 persons so that no two persons sit side by side is :

(A) ${}^7C_4$ (B) $4 \,.\, {}^7P_3$ (C) ${}^7C_3 \,.\, 4\,!$ (D) 840

Q.4 The equation of circle with centre (4, 3) and touching the circle $x^2 + y^2 = 1$ can be

(A) $x^2 + y^2 - 8x - 6y - 9 = 0$ (B) $x^2 + y^2 - 8x - 6y + 11 = 0$

(C) $x^2 + y^2 - 8x - 6y - 11 = 0$ (D) $x^2 + y^2 - 8x - 6y + 9 = 0$

Q.5 If words are formed using all the letters from the word 'PERSONAL' then identify the correct statement(s).

(A) Number of words which contain 'SONA' but not 'SONAL' is 5.

(B) Number of words in which 'EON' does not occupy last three positions is $60 \cdot 5!$

(C) Number of words in which vowels are in alphabetical order is $56 \cdot 5!$

(D) Number of words which contain 'PERSON' but not 'PERSONAL', is 5.

[MATRIX TYPE] [3+3+3+3=12]

Q.6

	Column-I		Column-II
(A)	The lines $y = 0$; $y = 1$; $x - 6y + 4 = 0$ and $x + 6y - 9 = 0$ constitute a figure which is	(P)	a cyclic quadraliteral
(B)	The points A(a, 0), B(0, b), C(c, 0) and D(0, d) are such that $ac = bd$ and a, b, c, d are all non-zero. The points A, B, C and D always constitute	(Q)	a rhombus
(C)	The figure formed by the four lines $ax \pm by \pm c = 0$ $(a \neq b)$, is	(R)	a square
(D)	The line pairs $x^2 - 8x + 12 = 0$ and $y^2 - 14y + 45 = 0$ constitute a figure which is	(S)	a trapezium

DPP : 3

[SINGLE CORRECT CHOICE TYPE] [4 × 3 = 12]

Q.1 A triangle has sides $a = 1, b = \sqrt{\frac{2}{3}}$ and $c = \frac{\sqrt{3}-1}{\sqrt{6}}$. The angle opposite side c, is

(A) 18° (B) 15° (C) 36° (D) 75°

Q.2 Number of six-digit numbers divisible by 5 that can be formed using the digits 4, 2, 5, 0, 6, 7 each digit to be used exactly once, is

(A) 308 (B) 240 (C) 216 (D) none

Q.3 Let a_k denotes the coefficient of x^k for the polynomial $(x+1)^3 (x+2)^3 (x+3)^3$. The sum of the digits in the sum $(a_2 + a_4 + a_6 + a_8)$, is

(A) 2 (B) 3 (C) 9 (D) 11

Q.4 Let P = (–1, 0), Q = (0, 0) and R = (3, $3\sqrt{3}$) be three ponts. Then the equation of the bisector of the angle PQR is

(A) $\frac{\sqrt{3}}{2}x + y = 0$ (B) $x + \sqrt{3}y = 0$ (C) $\sqrt{3}x + y = 0$ (D) $x + \frac{\sqrt{3}}{2}y = 0$

[JEE 2002 (Screening)]

[INTEGER TYPE] [2 × 5 = 10]

Q.5 Find the number of solutions of the equation $\sin 2\theta + \cos 2\theta + 4\sin\theta = 1 + 4\cos\theta$ lying in the interval $[-2\pi, 2\pi]$.

Q.6 Two tangents are drawn from P(1, 8) to the circle $x^2 + y^2 - 6x - 4y - 11 = 0$ touching the circle at A and B. A circle S passes through the point of intersection of circles $x^2 + y^2 - 2x - 6y + 6 = 0$ and $x^2 + y^2 + 2x - 6y + 6 = 0$ and intersects the circumcircle of ΔPAB orthogonally. If r is the radius of circle S then find [r].

[**Note :** [r] denotes the greatest integer less than or equal to r.]

DPP : 4

[COMPREHENSION TYPE] [6 × 3 = 18]

Paragraph for question nos 1 to 3

Consider the set $S = \{0, 1, 2, ..., 9\}$.

Q.1 Number of all five digit numbers that can be formed using the digits from S if their digits are indue order, is
(A) 126 (B) 252 (C) 310 (D) 378

Q.2 Number of all five digit numbers that can be formed using the digits from S containing 2 alike and 3 other alike digit, is
(A) 810 (B) 750 (C) 720 (D) none

Q.3 Number of 10-digit prime numbers that can be formed using each and every digit of S, is
(A) 0 (B) 1 (C) 10 (D) 100

Paragraph for question nos. 4 to 6

Let 2^{nd}, 3^{rd} and 4^{th} terms in the expansion of $(x + a)^n$, $n \in N$ and $a, x \in R$ are 240, 720 and 1080 respectively.

Q.4 The value of $(x - a)^n$ is equal to
(A) –1 (B) –32 (C) 64 (D) 128

Q.5 The smallest term in the expansion of $(x + a)^n$ is equal to
(A) 16 (B) 32 (C) 81 (D) 160

Q.6 The sum of odd-numbered terms in the expansion of $(x + a)^n$ is equal to
(A) 1486 (B) 1562 (C) 1664 (D) 2376

Dpp. No.-01 TO 04
(SOLUTIONS)

SOLUTIONS

DPP : 1

[SINGLE CORRECT CHOICE TYPE] [8 × 3 = 24]

Q.1 The value(s) of x satisfying the equation $\log_2 x + 2\log_2 x - \log_2(x-1) = 3$, is

(A) $2, -1 \pm \sqrt{5}$ (B) $1, -1 + \sqrt{5}$ (C*) $2, -1 + \sqrt{5}$ (D) $-1, -1 + \sqrt{5}$

[Sol.$_{194/log/SC}$ We have, $\log_2\left(\frac{x^3}{x-1}\right) = 3 \Rightarrow x^3 = 8(x-1) \Rightarrow x^3 - 8x + 8 = 0$

$\Rightarrow (x-2)(x^2 + 2x - 4) = 0$; $x = 2, -1 + \sqrt{5}$ (Note that $x > 1$)]

Q.2 If the equation $\sin 2\theta + \cos 2\theta = p$ has a solution then p **cannot** be

(A) $\frac{-1}{2}$ (B) 0 (C) $\frac{\pi}{4}$ (D*) $\frac{\pi}{2}$

[Sol.$_{365/ph\text{-}1/SC}$ We must have, $|p| \le \sqrt{2} \Rightarrow$ p **cannot** $\frac{\pi}{2}$. **Ans.**]

Q.3 The number of one element subset, the number of two element subsets and the number of three element subsets of a set containing more than three elements are consecutive terms of an A.P. The number of elements in the set can be,

(A) 2 (B) 5 (C*) 7 (D) 9

[Sol.$_{260/perm/SC}$ Given ${}^nC_1, {}^nC_2, {}^nC_3 \longrightarrow$ A.P.

$\therefore \quad 2 \cdot {}^nC_2 = {}^nC_1 + {}^nC_3$

$\frac{2n(n-1)}{2} = n + \frac{n(n-1)(n-2)}{6} \Rightarrow n^2 - 9n + 14 = 0$

$\therefore \quad n = 7$. **Ans.**]

Q.4 The value of $\sum_{n=1}^{\infty}\left(\frac{4n-2}{3^n}\right)$ is equal to

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

[Sol.$_{261/seq/SC}$ Arithmetico - geometric progression.]

Q.5 The smallest positive integral value of $y=\frac{x^2+x+7}{x+2}$, $x \in R$ is

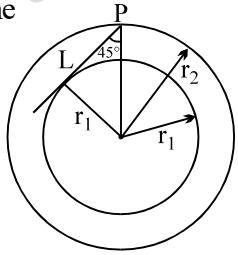
(A) 1 (B) 2 (C*) 3 (D) 4

[Sol.$_{397/qe/SC}$ Let $y=\frac{x^2+x+7}{x+2} \Rightarrow x^2+(1-y)x+(7-2y)=0$

As $x \in R$ so $D \geq 0 \Rightarrow (y+9)(y-3) \geq 0 \Rightarrow y \in (-\infty,-9] \cup [3,\infty)$]

Q.6 Two concentric circles are such that the smaller divides the larger into two regions of equal area. If the radius of the smaller circle is 2, then the length of the tangent from any point 'P' on the larger circle to the smaller circle is :

(A) 1 (B) $\sqrt{2}$ (C*) 2 (D) none



[Sol.$_{285/cir/SC}$

$\pi r_1^2 = \pi r_2^2 - \pi r_1^2$

$\Rightarrow 2r_1^2 = r_2^2 \Rightarrow r_2 = \sqrt{2}\, r_1$

Note P lies on the director circle of radius r_1

$\Rightarrow L = r_1 = 2$ cm]

Q.7 The most general values of θ which satisfy both the equations $\sqrt{2}\sin\theta+1=0$ and $\tan\theta-1=0$ is

(A) $n\pi+\frac{\pi}{4}$ (B) $2n\pi+\frac{3\pi}{4}$ (C*) $2n\pi-\frac{3\pi}{4}$ (D) $n\pi+\frac{3\pi}{4}$

(where $n \in I$)

[Sol.$_{103/ph-2/SC}$ $\sin\theta=\frac{-1}{\sqrt{2}}$ and $\tan\theta=1$

$\therefore \theta \in 3^{rd}$ quadrant.]

Q.8 The area bounded by the curves $y=|x|-1$ and $y=-|x|+1$ is

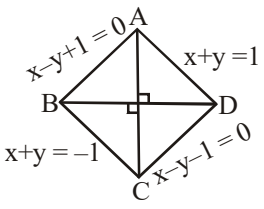
(A) 1 (B*) 2 (C) $2\sqrt{2}$ (D) 4

[JEE 2002 (Screening)]

[Sol.$_{248/st.line/SC}$ **[B]**

$y=|x|-1$ and $y=-|x|+1$

$y=|x|-1=\begin{cases} x-1 & x>0 \\ -x-1 & x<0 \end{cases}$; $y=-|x|+1=\begin{cases} -x-1 & x \geq 0 \\ x+1 & x<0 \end{cases}$



$AB = AD = BC = BD = \sqrt{2}$

$\therefore$ Area of squance = 2]

Fresher (For Class XII Appering) Target : JEE-(Mains / Advanced)

SOLUTIONS

DPP : 2

[MULTIPLE CORRECT CHOICE TYPE] [5 × 4 = 20]

Q.1 The possible integral value(s) of $f(x) = \dfrac{(x-2)^8 + 4(x-2)^7 + (x-2)^6 + 1}{(x-2)^6}$ $\forall\, x > 2$, is

(A) 1 (B) 2 (C*) 7 (D*) 8

[Sol.$_{40589/seq/MORE}$ $f(x) = (x-2)^2 + 4(x-2) + 1 + (x-2)^{-6}$

Let $x - 2 = k > 0$

$E = k^2 + 4k + 1 + k^{-6}$

Apply A.M. $\geq$ G.M.

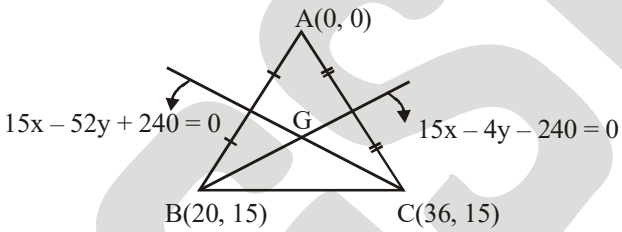
$$\frac{k^2 + k + k + k + k + 1 + k^{-6}}{7} \geq 1 \quad \Rightarrow \quad E \geq 7. \ ]$$

Q.2 The vertex A of triangle ABC is at origin. The equation of medians through B and C are $15x - 4y = 240$ and $15x - 52y + 240 = 0$ respectively. Then

(A) the incentre of triangle ABC is (12, 21) (B*) the incentre of triangle ABC is (21, 12)

(C*) the orthocentre of triangle ABC is (0, 63) (D) the orthocentre of triangle ABC is (63, 0)

[Sol.$_{40572/st.line/MORE}$



]

Q.3 There are 10 seats in the first row of a theatre of which 4 are to be occupied . The number of ways of arranging 4 persons so that no two persons sit side by side is :

(A) $^7C_4$ (B*) $4 \,.\, ^7P_3$ (C*) $^7C_3 \,.\, 4\,!$ (D*) 840

[Sol.$_{40506/perm/MORE}$ 4 to be occupied say s s s s

Remaining 6 are | x | x | x | x | x | x |. Now 4 can be selected in $^7C_4$ ways and can be arranged in $^7C_4 \,.\, 4\,!$ ways.]

Q.4 The equation of circle with centre (4, 3) and touching the circle $x^2 + y^2 = 1$ can be

(A) $x^2 + y^2 - 8x - 6y - 9 = 0$ (B) $x^2 + y^2 - 8x - 6y + 11 = 0$

(C*) $x^2 + y^2 - 8x - 6y - 11 = 0$ (D*) $x^2 + y^2 - 8x - 6y + 9 = 0$

[Sol.$_{40532/circle/MORE}$

Let the required circle be $(x-4)^2 + (y-3)^2 = r^2$

Given circle is $x^2 + y^2 = 1$

Both the circles are touching each other

$\therefore$ $c_1c_2 = r_1r_2$ or $c_1c_2 = |r_1 - r_2|$

$5 = r + 1$ or $5 = |r - 1|$

$\Rightarrow$ $r = 4$ $\quad$ $r = 6,\ r = -4$ (Rejected)

$\therefore$ $(x-4)^2 + (y-3)^2 = 16$ or $(x-4)^2 + (y-3)^2 = 36$ **Ans.**]

Q.5 If words are formed using all the letters from the word 'PERSONAL' then identify the correct statement(s).

(A) Number of words which contain 'SONA' but not 'SONAL' is 5.

(B) Number of words in which 'EON' does not occupy last three positions is $60 \cdot 5!$

(C*) Number of words in which vowels are in alphabetical order is $56 \cdot 5!$

(D*) Number of words which contain 'PERSON' but not 'PERSONAL', is 5.

[Sol.$_{40529/perm/MORE}$ PERSONAL

(A) Required number of words = P, E, R, (SONA), L – P,E,R, (SONAL)
$5! - 4! = 96$

(B) Required number of words $= 8! - 5!$

(C) Required number of words $= {}^8C_5 \times 5! \times 1 = 56 \cdot 5!$

(D) Required number of words = PERSON, A, L – PERSONAL
$3! - 1 = 5$]

[MATRIX TYPE] [3+3+3+3=12]

Q.6

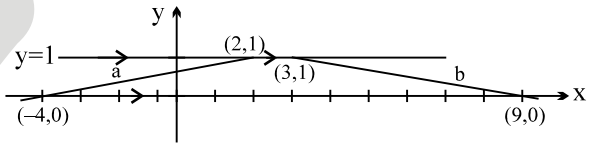
	Column-I		Column-II
(A)	The lines $y = 0;\ y = 1;\ x - 6y + 4 = 0$ and $x + 6y - 9 = 0$ constitute a figure which is	(P)	a cyclic quadraliteral
(B)	The points A(a, 0), B(0, b), C(c, 0) and D(0, d) are such that $ac = bd$ and a, b, c, d are all non-zero. The points A, B, C and D always constitute	(Q)	a rhombus
(C)	The figure formed by the four lines $ax \pm by \pm c = 0$ $(a \neq b)$, is	(R)	a square
(D)	The line pairs $x^2 - 8x + 12 = 0$ and $y^2 - 14y + 45 = 0$ constitute a figure which is	(S)	a trapezium

[Ans. (A) P, S; (B) P; (C) Q; (D) P, Q, R]

[Sol.$_{92006/st.line/MTC}$

(A) obviously trapezium

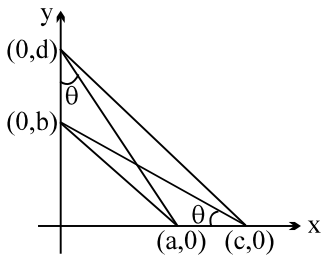
$$\left.\begin{matrix} a = \sqrt{37} \\ b = \sqrt{37} \end{matrix}\right] \Rightarrow a = b$$



hence isosceles trapezium

$\Rightarrow$ a cyclic quadrilateral also $\Rightarrow$ **P, S**

(B) $ac = bd \Rightarrow \dfrac{b}{c} = \dfrac{a}{d}$



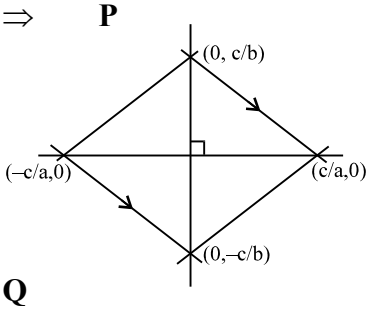
$$\left.\begin{matrix} \tan\theta = \dfrac{b}{c} \\ \tan\phi = \dfrac{a}{d} \end{matrix}\right] \Rightarrow \theta = \phi$$

hence cyclic quadrilateral $\Rightarrow$ **P**

(C) $ax \pm by \pm c = 0$

if $y = 0$, $\quad x = \pm \dfrac{c}{a}$

if $x = 0$, $\quad y = \pm \dfrac{c}{b}$



$\Rightarrow$ rhombus $\Rightarrow$ **Q**

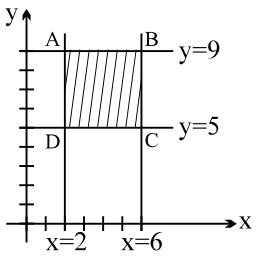
(D) $(x-6)(x-2)=0$

$x=6$ and $x=2$

$y^2-14y+45=0$

$(y-9)(y-5)=0$

$\Rightarrow$ a square $\Rightarrow$ **P, Q, R**]



SOLUTIONS

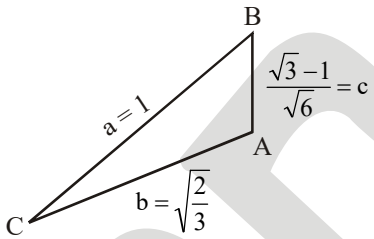
DPP : 3

[SINGLE CORRECT CHOICE TYPE] [4 × 3 = 12]

Q.1 A triangle has sides $a = 1, b = \sqrt{\frac{2}{3}}$ and $c = \frac{\sqrt{3}-1}{\sqrt{6}}$. The angle opposite side c, is

(A) 18° (B*) 15° (C) 36° (D) 75°

[Sol.$_{160/sot/SC}$ Cosine formula



$$\text{[Sol. } \cos C = \frac{a^2+b^2-c^2}{2ab} = \frac{1+\frac{2}{3}-\frac{(\sqrt{3}-1)^2}{6}}{2(1)\left(\frac{\sqrt{2}}{\sqrt{3}}\right)} = \left(\frac{\sqrt{3}+1}{2\sqrt{2}}\right)$$

$\therefore$ C = 15°]

Q.2 Number of six-digit numbers divisible by 5 that can be formed using the digits 4, 2, 5, 0, 6, 7 each digit to be used exactly once, is

(A) 308 (B) 240 (C*) 216 (D) none

[Sol.$_{232/perm/SC}$ Total = 6! – 5! = 600

divisible by 5

(a) 5! = 120 | | | | | | 0 |

+

(b) 5! – 4! = 96 | | | | | | 5 |

a + b = 216 **Ans.**]

Q.3 Let a_k denotes the coefficient of x^k for the polynomial $(x+1)^3 (x+2)^3 (x+3)^3$. The sum of the digits in the sum $(a_2 + a_4 + a_6 + a_8)$, is

(A) 2 (B*) 3 (C) 9 (D) 11

[Sol.$_{173/bin/SC}$ Let $P(x) = (x+1)^3 (x+2)^3 (x+3)^3$

As the degree of P(x) is 9, hence

let

$(x+1)^3 (x+2)^3 (x+3)^3 \equiv a_0 + a_1x + a_2x^2 + a_3x^3 + a_4x^4 + a_5x^5 + a_6x^6 + a_7x^7 + a_8x^8 + a_9x^9$ .....(1)

Put x = 1

$a_0 + a_1 + a_2 + a_3 + a_4 + a_5 + a_6 + a_7 + a_8 + a_9 = 8 \cdot 27 \cdot 64 = 13824$

Put x = – 1

$a_0 - a_1 + a_2 - a_3 + a_4 - a_5 + a_6 - a_7 + a_8 - a_9 = 0$

$\therefore$ $P(1) + P(-1) = 2(a_0 + a_2 + a_4 + a_6 + a_8) = 13824$

Put $x = 0$

$a_0 = 8 \cdot 27 = 216 \Rightarrow 2a_0 = 432$

$\therefore\ 2(a_2 + a_4 + a_6 + a_8) = 13824 - 432 = 13392$

$\therefore\ a_2 + a_4 + a_6 + a_8 = 6696$

$\therefore$ Sum of digits = 27. **Ans.]**

Q.4 Let P = (–1, 0), Q = (0, 0) and R = $(3, 3\sqrt{3})$ be three ponts. Then the equation of the bisector of the angle PQR is

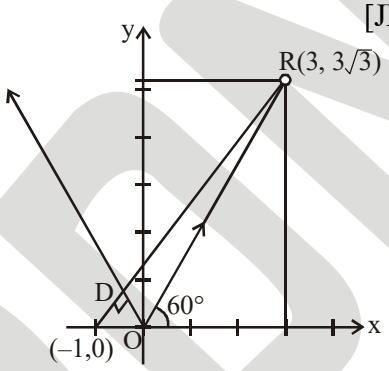
(A) $\frac{\sqrt{3}}{2}x + y = 0$ (B) $x + \sqrt{3}y = 0$ (C*) $\sqrt{3}x + y = 0$ (D) $x + \frac{\sqrt{3}}{2}y = 0$

[JEE 2002 (Screening)]

[Sol.$_{246/st.line/SC}$ MQD = tan 120° = $-\sqrt{3}$

equation $y = -\sqrt{3}x$

$y = \sqrt{3}x = 0 \Rightarrow$ C]



[INTEGER TYPE] [2 × 5 = 10]

Q.5 Find the number of solutions of the equation $\sin 2\theta + \cos 2\theta + 4\sin\theta = 1 + 4\cos\theta$ lying in the interval $[-2\pi, 2\pi]$.

[Ans. 4]

[Sol.$_{50731/ph-2/OMR}$ We have, $2\sin\theta \cdot \cos\theta + 1 - 2\sin^2\theta + 4\sin\theta = 1 + 4\cos\theta$

$\Rightarrow$ $2\sin\theta(\cos\theta - \sin\theta) - 4(\cos\theta - \sin\theta) = 0$

$\Rightarrow$ $(2\sin\theta - 4)(\cos\theta - \sin\theta) = 0$

But $\sin\theta = 2$ (Reject)

$\therefore$ $\tan\theta = 1 \Rightarrow \theta = n\pi + \frac{\pi}{4}$, $n \in I$.

$\therefore$ Number of solutions between $[-2\pi, 2\pi]$ are 4, i.e.,

$\theta = \frac{-7\pi}{4}, \frac{-3\pi}{4}, \frac{\pi}{4}, \frac{5\pi}{4}$. **Ans.]**

Q.6 Two tangents are drawn from P(1, 8) to the circle $x^2 + y^2 - 6x - 4y - 11 = 0$ touching the circle at A and B. A circle S passes through the point of intersection of circles $x^2 + y^2 - 2x - 6y + 6 = 0$ and $x^2 + y^2 + 2x - 6y + 6 = 0$ and intersects the circumcircle of ΔPAB orthogonally. If r is the radius of circle S then find [r].

[**Note :** [r] denotes the greatest integer less than or equal to r.] [Ans. 2]

[Sol.$_{50776/cir/OMR}$ $S_1 \equiv (x-1)(x-3) + (y-8)(y-2) = 0$

or $S_1 \equiv x^2 + y^2 - 4x - 10y + 19 = 0$

and S is $x^2 + y^2 - 2x\left(\frac{1-\lambda}{1+\lambda}\right) - 6y + 6 = 0$

$\because$ S and S_1 intersect orthogonally

$\Rightarrow 2gg_1 + 2ff_1 = c + c_1$ gives $\lambda = -9$

$\therefore$ S is $x^2 + y^2 + \frac{5}{2}x - 6y + 6 = 0$

$\therefore \; r = \sqrt{\frac{25}{16} + 9 - 6} = \frac{\sqrt{73}}{4}$

$\therefore$ [r] = 2. **Ans.**]

SOLUTIONS

DPP : 4

[COMPREHENSION TYPE] [6 × 3 = 18]

Paragraph for question nos 1 to 3

Consider the set $S = \{0, 1, 2, ..., 9\}$.

Q.1 Number of all five digit numbers that can be formed using the digits from S if their digits are indue order, is

(A) 126 (B) 252 (C) 310 (D*) 378

Q.2 Number of all five digit numbers that can be formed using the digits from S containing 2 alike and 3 other alike digit, is

(A*) 810 (B) 750 (C) 720 (D) none

Q.3 Number of 10-digit prime numbers that can be formed using each and every digit of S, is

(A*) 0 (B) 1 (C) 10 (D) 100

[Sol. 304018-19-20/perm

(i) $\underbrace{{}^{9}C_5}_{\text{zero can not be included}}$ *increasing order* + *decreasing order* $\underbrace{{}^{10}C_5}_{\text{zero can be taken}}$ = 378 **Ans.**

(ii) **(a)** <u>zero excluded</u>

$${}^{9}C_2 \cdot 2 \cdot \frac{5!}{3!2!} \qquad (11222 \text{ or } 22111)$$

$$= 36 \cdot 2 \cdot 10 = 720$$

(b) <u>zero included</u>

$${}^{9}C_1\left[\frac{5!}{3!\cdot 2!} - \frac{4!}{2!\cdot 2!}\right] + {}^{9}C_1\left[\frac{5!}{3!\cdot 2!} - \frac{4!}{3!}\right]$$

$$= 9[10 - 6] + 9[10 - 4]$$

$$= 36 + 54 = 90$$

Total = 810 **Ans.**

(iii) N = | a_1 | a_2 | a_3 | a_4 | a_5 | a_6 | a_7 | a_8 | a_9 | a_{10} |

As sum of digits = 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 0 = 45, which is divisible by 3, so no such number exist.]

Paragraph for question nos. 4 to 6

Let 2nd, 3rd and 4th terms in the expansion of $(x + a)^n$, $n \in N$ and $a, x \in R$ are 240, 720 and 1080 respectively.

Q.4 The value of $(x - a)^n$ is equal to

(A*) –1 (B) –32 (C) 64 (D) 128

Q.5 The smallest term in the expansion of $(x + a)^n$ is equal to

(A) 16 (B*) 32 (C) 81 (D) 160

Q.6 The sum of odd-numbered terms in the expansion of $(x + a)^n$ is equal to

(A) 1486 (B*) 1562 (C) 1664 (D) 2376

[Sol.$_{30413\text{-}414\text{-}415/bin}$ $t_2 = 240$

$\Rightarrow {}^nc_1 (x)^{n-1} (a) = 240$ ……(i)

$t_3 = 720$

$\Rightarrow {}^nc_2 (x)^{n-2} (a)^2 = 720$ ……(ii)

and

$t_4 = 1080$

$\Rightarrow {}^nc_3 (x)^{n-3} (a)^3 = 1080$ ……(iii)

$$\therefore \frac{[\text{Equation (i)}] \times [\text{Equation (iii)}]}{[\text{Equation (ii)}]^2} \Rightarrow \frac{240 \times 1080}{(720)^2} = \frac{({}^nc_1)({}^nc_3)}{({}^nc_2)^2}$$

$\Rightarrow n = 5$ (As $n \neq 1$)

$\therefore$ From (i) and (ii), we get

$x = 2$ and $a = 3$

So, $x = 2$, and $a = 3$ and $n = 5$.]