JEE MAIN April'19

PAPER WITH SOLUTION

12 April 2019 _ Morning _ Maths

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1. The number of wayes of choosing 10 objects out of 31 objects of which 10 are identical and the remaining 21 are distinct, is :
(1) $2^{20}+1$ (2) 2^{20} (3) $2^{20}-1$ (4) 2^{21}

Sol. **2**

(i) $10I \to 1$

(ii) $9I + 1D \to {}^{21}C_1$

(iii) $8I + 2D \to {}^{21}C_2$

. .
. .
. .
. ${}^{21}C_{10}$

$\Rightarrow \underbrace{{}^{21}C_0 + {}^{21}C_1 + \ldots\ldots {}^{21}C_{10}} = 2^{20}$

2. Let a random variable X have a binomial distribution with mean 8 and variance 4. If $P(X \le 2) = \frac{k}{2^{16}}$, then k is equal to :
(1) 17 (2) 137 (3) 121 (4) 1

Sol. **2**
np = 8, p+q = 1
npq = 4, q = 1/2 , p = 1/2
$\therefore$ n=16

$\left({}^{16}C_0 + {}^{16}C_1 + {}^{16}C_2\right)\frac{1}{2^{16}} = \frac{k}{2^{16}}$

$1 + 16 + 15 \times 8 = 17 + 120 = 137$

3. If A is a symmetric matrix and B is a skew-symmetrix matrix such that $A+B=\begin{bmatrix} 2 & 3 \\ 5 & -1 \end{bmatrix}$, then AB is equal to :

(1) $\begin{bmatrix} -4 & 2 \\ 1 & 4 \end{bmatrix}$ (2) $\begin{bmatrix} 4 & -2 \\ -1 & -4 \end{bmatrix}$ (3) $\begin{bmatrix} 4 & -2 \\ 1 & -4 \end{bmatrix}$ (4) $\begin{bmatrix} -4 & -2 \\ -1 & 4 \end{bmatrix}$

Sol. 2

$\begin{bmatrix} 2 & 3 \\ 5 & -1 \end{bmatrix} = A + B$

$X^T = \begin{bmatrix} 2 & 5 \\ 3 & -1 \end{bmatrix}$ $\therefore A = \frac{X + X^T}{2}$, $B = \frac{X - X^T}{2}$

$A = \begin{bmatrix} 4 & 8 \\ 8 & -2 \end{bmatrix}$, $B = \begin{bmatrix} 0 & -2 \\ 2 & 0 \end{bmatrix}$

$A = \begin{bmatrix} 2 & 4 \\ 4 & -1 \end{bmatrix}$, $B = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$

$\therefore AB = \begin{bmatrix} 4 & -2 \\ -1 & -4 \end{bmatrix}$

4. For $x \in \left(0, \frac{3}{2}\right)$, let f(x) = $\sqrt{x}$, g(x)= tanx and $h(x) = \frac{1-x^2}{1+x^2}$. If $\phi(x) = (\text{hof})\text{og})(x)$, then $\phi\left(\frac{\pi}{3}\right)$ is equal to :

(1) $\tan\frac{5\pi}{12}$ (2) $\tan\frac{\pi}{12}$ (3) $\tan\frac{7\pi}{12}$ (4) $\tan\frac{11\pi}{12}$

Sol. **4**

$\phi(x) = ((\text{hof})\text{og})(x)$

= h{f(g(x)4

$g\left(\frac{\pi}{3}\right) = \sqrt{3}$

$f\left(\sqrt{3}\right) = 3^{1/4}$

$h\left(3^{1/4}\right) = \frac{1-\sqrt{3}}{1+\sqrt{3}}$

$= -\left(\frac{1-\sqrt{3}}{1+\sqrt{3}}\right) = -\left(2-\sqrt{3}\right)$

$= -\tan\frac{\pi}{12} = \tan\left(\frac{11\pi}{12}\right)$

5. If m is the minimum value of k for which the function $f(x) = x\sqrt{kx - x^2}$ is increasing in the interal [0,3] and M is the maximum value of f in [0,3] when k =m, then the ordered pair (m,M) is equal to :

(1) $\left(3, 3\sqrt{3}\right)$ (2) $\left(5, 3\sqrt{6}\right)$ (3) $\left(4, 3\sqrt{6}\right)$ (4) $\left(4, 3\sqrt{3}\right)$

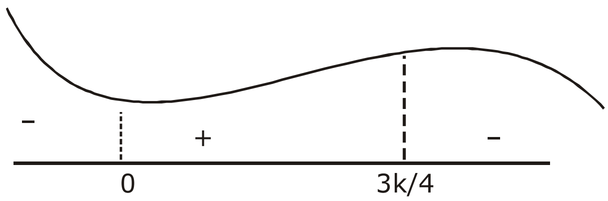
Sol. 4

$f = x\sqrt{kx - x^2}$

$f' = \sqrt{kx - x^2} + \frac{x(k-2x)}{2\sqrt{kx - x^2}}$

$= \frac{2kx - 2x^2 + kx - 2x^2}{2\sqrt{kx - x^2}}$

$$= \frac{3kx - 4x^2}{2\sqrt{kx - x^2}} = x\,(3k - 4x)$$



$f \uparrow$ in $\left[0, \frac{2x}{3}\right] \Rightarrow \frac{3k}{4} \geq 3$

m = 4

$\Rightarrow f(x) = x\sqrt{4x - x^2}$

now from = M = f(3)

$= 3\sqrt{12 - 9} = 3\sqrt{3}$

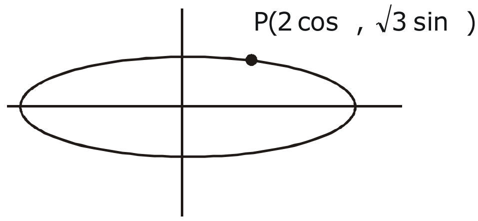
6. If the normal to the ellipse $3x^2+4y^2 = 12$ at a point P on it is parallel to the lien, $2x + y = 4$ and the tangent to the ellipse at P passes through Q (4,4) then PQ is equal to :

(1) $\frac{\sqrt{157}}{2}$ (2) $\frac{5\sqrt{5}}{2}$ (3) $\frac{\sqrt{221}}{2}$ (4) $\frac{\sqrt{61}}{2}$

Sol. 2

$m_n = -2$

$\frac{x^2}{4} + \frac{4^2}{3} = 1$



$\frac{XCOS\theta}{2} + \frac{y\sin\theta}{\sqrt{3}} = 1$

$m_t = -\frac{\sqrt{3}}{2}\cot\theta$

$m_n = \frac{2}{\sqrt{3}}\tan\theta = -2$

$\tan\theta = -\sqrt{3}$

$\theta = \frac{2\pi}{3}, \frac{5\pi}{3}$

$P\left(-1, \frac{3}{2}\right)$, Q(4,4)

$PQ = \sqrt{25 + \frac{25}{4}} = \sqrt{\frac{125}{4}} = \frac{5\sqrt{5}}{2}$

7. If α and β are the roots of the equation $375x^2 - 25x - 2 = 0$, then $\lim\limits_{n\to\infty}\sum\limits_{r=1}^{n}\alpha^r + \lim\limits_{n\to\infty}\sum\limits_{r=1}^{n}\beta^r$ is equal to :

(1) $\frac{1}{12}$ (2) $\frac{21}{346}$ (3) $\frac{29}{358}$ (4) $\frac{7}{16}$

Sol. **1**

$375x^2-25x-2 = 0$

$$\frac{\alpha}{1-\alpha}+\frac{\beta}{1-\beta}=\sum_{r=1}^{n}\alpha^r+\sum_{r=1}^{n}\beta^r$$

$$\frac{\alpha+\beta-2\alpha\beta}{1-(\alpha+\beta)+\alpha\beta}$$

$$=\frac{25/375+2.2/375}{1-\frac{25}{375}-\frac{2}{375}}$$

$$=\frac{29}{375-27} = 29/348 = 1/12$$

8. Let S_n denote the sum of the first n terms of an A.P.. If $S_4 = 16$ and $S_6 = -48$, then S_{10} is equal to :

(1) – 260 (2) – 380 (3) – 320 (4) – 410

Sol. **3**

$2\{2a+3.d\}=16$ $\quad$ $3\{2a + 5d\} = -48$

$2a + 3d = 18$ $\quad$ $2a + 5d = -16$

$3d - 5d = 8 + 16$

$= d = -12$

$2a - 36 = 8$

$2a = 44$

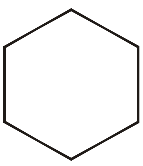
$a = 22$

$S_{10} = 5\{44+9(-12)\} = = 5\{44-108\} = -320$

9. If there of the six vertices of a regular hexagon are chosen at random, then the probability that the triangle formed with these chosen vertices is equilateral is :

(1) $\frac{1}{5}$ (2) $\frac{3}{10}$ (3) $\frac{1}{10}$ (4) $\frac{3}{20}$

Sol. **3**



$$\frac{2}{^6C_3} = 1/10$$

10. The integral $\int \frac{2x^3-1}{x^4-x}dx$ is equal to :

(Here C is a constant of integration)

(1) $\log_e \frac{|x^3+1|}{x^2}+C$

(2) $\log_e \frac{|x^3+1|}{|x|}+C$

(3) $\frac{1}{2}\log_e \frac{|x^3+1|}{x^2}+C$

(4) $\frac{1}{2}\log_e \frac{|x^3+1|}{|x^3|}+C$

Sol. **2**

$$\int\left(\frac{2x^3-1}{x^4+x}\right)dx = \int \frac{(2x^3-1)}{x(x^3+1)}dx$$

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

$$= \int \frac{4x^3+1}{x^4+x} = -2\int \frac{x^3+1}{x^4+x}\,dx$$

$$= \ln|x^4+x| - 2\int \frac{dx}{x}$$

$$= \ln|x^4+x| - 2\ln x + C$$

$$= \ln\left|\frac{x^4+x}{x^2}\right| + C$$

$$= \ln\left|\frac{x^3+1}{x}\right| + C$$

11. If the line $\frac{x-2}{3}=\frac{y+1}{2}=\frac{z-1}{-1}$ intersects the plane 2x+3y-z+13=0 at a point P and the plane 3x+y+4z=16 at a point Q then PQ is equal to :

(1) $\sqrt{14}$ (2) $2\sqrt{7}$ (3) 14 (4) $2\sqrt{14}$

Sol. **4**

$$\frac{x-2}{3}=\frac{y+1}{2}=\frac{z-1}{-1}=\lambda$$

$x = 3\lambda + 2,\ y = 2\lambda - 1,\ z = -\lambda + 1$

$P_1 : 6\lambda + 4 + 6\lambda - 3 + \lambda - 1 + 13 = 0$

$13\lambda = -13$

$\lambda = -1$ $\therefore$ P(−1, −3, 2)

$P_2 :\ 9\lambda + 6 + 2\lambda - 1 - 4\lambda + 4 = 16$

$7\lambda = 7$

$\lambda = 1$ $\therefore$ Q (5, 1, 0)

PQ = $\sqrt{36+16+4}$

= $\sqrt{56}$ = $2\sqrt{14}$

12. If the data $x_1, x_2, \ldots\ldots, x_{10}$ is such that the mean of first four of these is 11, the mean of the remaining six is 16 and the sum of squares of all of these is 2,000 ; then the standard deviation of this data is :

(1) 4 (2) 2 (3) $\sqrt{2}$ (4) $2\sqrt{2}$

Sol. **2**

$$\frac{x_1 + x_2 + x_3 + x_4}{4} = 11$$

$x_1 + x_2 + x_3 + x_4 = 44$

$$\frac{x_5 + \ldots\ldots + x_{10}}{6} = 16$$

$$x_5 + \ldots\ldots x_{10} = 96$$

$$x_1 + x_2 + \ldots x_{10} = 140$$

$$\text{s.d} = \sqrt{\frac{\sum x_i^2}{n} - (\bar{x}_i)^2} = \sqrt{200 - 196} = 2$$

13. Consider the differential equation $y^2dx + \left(x - \frac{1}{y}\right)dy = 0$. If value of y is 1 when x = 1, then the value of x for which y =- 2, is :

(1) $\frac{5}{2} - \frac{1}{\sqrt{e}}$ (2) $\frac{3}{2} - \frac{1}{\sqrt{e}}$ (3) $\frac{1}{2} + \frac{1}{\sqrt{e}}$ (4) $\frac{3}{2} - \sqrt{e}$

Sol. **2**

$$y^2dx = \left(\frac{1}{y} - x\right)dy$$

$$\frac{dx}{dy} = \frac{1}{y^3} - \frac{x}{y^2}$$

I.f. = $e^{-1/y}$

$$x.\ e^{-1/y} = \int e^{-1/y}.\frac{1}{y^3}dy$$

$$= \quad -\frac{1}{y} = t$$

$$= -\left[t.e^t - e^t + c\right]$$

$$xe^{-1/y} = -\left\{\frac{-1}{y}.e^{-1/y} - e^{-1/y}\right\} + C$$

$\left(x = \frac{1}{y} + 1 + ce^{1/y}\right)$

put x = 1, y = 1

$C = -\frac{1}{e}$

put y = 2

$x = \frac{3}{2} - \frac{1}{\sqrt{e}}$

14. If the truth value of the statement $p \to (\sim q \vee r)$ is false(F), then the truth values of the statement p, q, r are respectively :

(1) T,F,T (2) T,F,F (3) F,T,T (4) T,T,F

Sol. **4**

Check from option

$p \to T,\ q \to T,\ r \to F$

$T \to (F \vee F)$

$T \to F$

$\Rightarrow F$

15. If the area (in sq. units) of the region $\{(x,y) : y^2 \le 4x,\ x+y \le 1,\ x \ge 0,\ y \ge 0\}$ is $a\sqrt{2} + b$, then a-b is equal to :

(1) $\frac{10}{3}$ (2) 6 (3) $\frac{8}{3}$ (4) $-\frac{2}{3}$

Sol. **2**

$x + y - 1 \le 0$

$(1 - x)^2 = 4x$

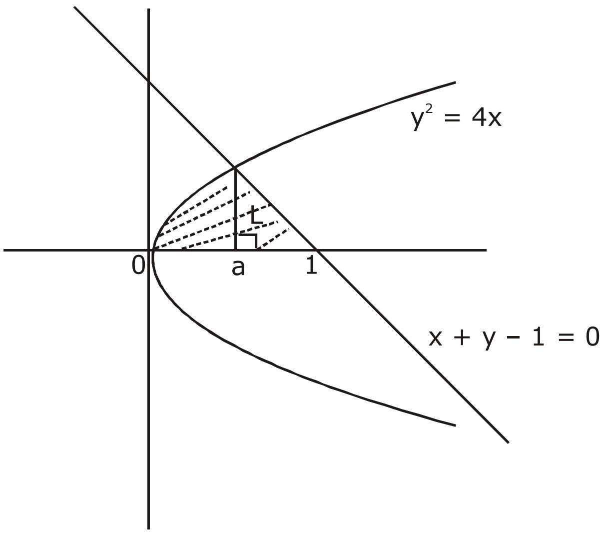
$1 + x^2 - 2x = 4x$

$x^2 - 6x + 1 = 0$

$\frac{6 \pm \sqrt{36-4}}{2}$

$a = 3 - 2\sqrt{2}$

$y = 1 - x$



$A = \int_0^a 2\sqrt{x}\,dx + \frac{1}{2}(1-a)(b)$

$= \frac{2.x^{3/2}}{3/2} + \frac{1}{2}\left(1 - 3 + 2\sqrt{2}\right)^2$

$= \frac{4}{3}\left(\sqrt{3-2\sqrt{2}}\right)^3 + \frac{1}{2}\left(2 - 2\sqrt{2}\right)^2$

$$= \frac{4}{3}(\sqrt{2}-1)^3 + 2(\sqrt{2}-1)^2$$

$$= (3-2\sqrt{2})\left\{\frac{4}{3}(\sqrt{2}\ a) + 2\right\}$$

$$= (3-2\sqrt{2})\left\{\frac{4\sqrt{2}}{3} + \frac{2}{3}\right\}$$

$$= \frac{8\sqrt{2}}{3} - \frac{10}{3}$$

16. If $\int_0^{\pi/2} \frac{\cot x}{\cot x + \operatorname{cosec} x} dx = m(\pi + n)$, then m.n is equal to :

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

Sol. **1**

$$\int_0^{\pi/2} \frac{\cot x}{\cot x + \operatorname{cosec} x} dx = m(\pi + n)$$

$$= \int_0^{\pi/2} \frac{\cos x}{\cot x + 1} dx$$

$$= \int_0^{\pi/2} \frac{\cos x(1-\cos x)}{\sin^2 x} dx$$

$$= \int_0^{\pi/2} \frac{\cos x}{\sin^2 x} dx - \int_0^{\pi/2} \cot^2 x\ dx$$

$$= \int_0^1 \frac{dt}{t^2} - (-\cot x - x)_0^{\pi/2}$$

$$= \left(-\frac{1}{t}\right)_0^1 + (\cot x + x)_0^{\pi/2}$$

$\Rightarrow m = 1/2, \quad n = -2$

$m.n = -1$

17. The equation $y = \sin x \sin(x+2) - \sin^2(x+1)$ represents a straight line lying in :

(1) Second and third quadrants only

(2) first, third and fourth quadrants

(3) third and fourth quadrants only
(4) first, second and fourth quadrants

Sol. **3**

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

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

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

$$y = \frac{\cos 2 - 1}{2}$$

18. If the volume of parallelopiped formed by the vectors $\hat{i} + \lambda\hat{j} + \hat{k}, \hat{j} + \lambda\hat{k}$ and $\lambda\hat{i} + \hat{k}$ is minimu, then λ is equal to :

(1) $-\frac{1}{\sqrt{3}}$ (2) $-\sqrt{3}$ (3) $\sqrt{3}$ (4) $\frac{1}{\sqrt{3}}$

Sol. **4**

$$\begin{vmatrix} 1 & \lambda & 1 \\ 0 & 1 & \lambda \\ \lambda & 0 & 1 \end{vmatrix}$$

$= 1\ (1) + \lambda(\lambda^2 + 1)$

$v = |\lambda^3 - \lambda + 1|$

$\left(\lambda = 1/\sqrt{3}\right)$ pt of local Minima / but | v | should be 'O' for Minimum

19. If $B = \begin{bmatrix} 5 & 2\alpha & 1 \\ 0 & 2 & 1 \\ \alpha & 3 & -1 \end{bmatrix}$ is the inverse of a 3×3 matrix A, then the sum of all values of α for which det (A)+1 = 0, is :

(1) -1 (2) 0 (3) 1 (4) 2

Sol. **3**

$$|A^{-1}| = \frac{1}{|A|}$$

$$|B| = \frac{1}{|A|}$$

$\therefore \dfrac{1}{|B|} + 1 = 0$

$|B| = -1$

$$\begin{vmatrix} 5 & 2\alpha & 1 \\ 0 & 2 & 1 \\ \alpha & 3 & -1 \end{vmatrix} = -1$$

$= 5(-5) + \alpha(2\alpha - 2) = -1$

$= -25 + 2\alpha^2 - 2\alpha = -1$

$= 2\alpha^2 - 2\alpha - 24 = 0$

$= a\,\alpha^2 - \alpha - 12 = 0$

$(\alpha - 4)(\alpha + 3) = 0$

20. The value of $\sin^{-1}\left(\dfrac{12}{13}\right) - \sin^{-1}\left(\dfrac{3}{5}\right)$ is equal to :

(1) $\pi - \cos^{-1}\left(\dfrac{33}{65}\right)$ (2) $\pi - \sin^{-1}\left(\dfrac{63}{65}\right)$ (3) $\dfrac{\pi}{2} - \sin^{-1}\left(\dfrac{56}{65}\right)$ (4) $\dfrac{\pi}{2} - \cos^{-1}\left(\dfrac{9}{65}\right)$

Sol. **3**

$\tan^{-1}\dfrac{12}{5} - \tan^{-1}\dfrac{3}{4}$

$= \tan^{-1}\left(\dfrac{\frac{12}{5} - \frac{3}{4}}{1 + \frac{12}{5}.\frac{3}{4}}\right)$

$= \tan^{-1}\left(\dfrac{48 - 15}{20 + 36}\right) = \dfrac{\pi}{2} - \sin^{-1}\dfrac{56}{65}$

21. A 2 m ladder leans against a vertical wall. If the top of the ladder begins to slide down the wall at the rate 25cm/sec. then the rate (in cm/sec.) at which the bottom of the ladder slides away from the wall on the horizontal ground when the top of the ladder is 1 m above the ground is :

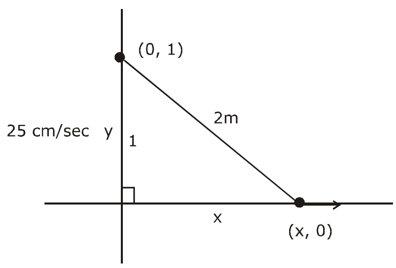
(1) 25 (2) $\dfrac{25}{\sqrt{3}}$ (3) $25\sqrt{3}$ (4) $\dfrac{25}{3}$

Sol. **2**

$\dfrac{dy}{dx} = -25$

$= x^2 + y^2 = 4$

$= 2x\dfrac{dx}{dt} + 2y\dfrac{dy}{dt} = 0$



$y = 1,\ x = \sqrt{3}$

$\therefore \dfrac{dx}{dt} = \dfrac{25}{\sqrt{3}}$

22. The equation $|z-i| = |z-1|, i = \sqrt{-1}$, represents:

(1) a circle of radius 1/2
(2) the line through the origin with slope 1
(3) a circle of radius 1
(4) the line through the origin with slope -1

Sol. **2**

$|z-i| = |z-1|$

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

$x = y$

23. Let P be the point of intersection of the common tangents to the parabola $y^2 = 12x$ and the hyperbola $8x^2 - y^2 = 8$. If S and S' denote the foci of the hyperbola where S lies on the positive x-axis then P divides SS' in a ratio :

(1) 5:4
(2) 14:13
(3) 2:1
(4) 13:11

Sol. **1**

$y = mx + \dfrac{3}{m}$

put in $8x^2 - y^2 = 8$

& equate D = 0

m = ± 3

so, eq. of tangent are

y = 3x + 1 7 y = – 3x /0 1

$\Rightarrow P\left(-\dfrac{1}{3}, 0\right)$

λ 1

S P S'

(−3,0) (−1/3,0) (3,0)

λ = 5/4

24. For $x \in R$, let [x] denote the greatest integer $\leq x$, then the sum of the series

$\left[\dfrac{-1}{3}\right] + \left[\dfrac{-1}{3} - \dfrac{1}{100}\right] + \left[\dfrac{-1}{3} - \dfrac{2}{100}\right] + \ldots + \left[\dfrac{-1}{3} - \dfrac{99}{100}\right]$

(1) -133
(2) -135
(3) -131
(4) -153

Sol. **1**

$\left[-\frac{1}{3}\right]+\left[-\frac{1}{3}-\frac{1}{100}\right]+\ldots\ldots\left[-\frac{1}{3}-\frac{99}{100}\right]$

$\Rightarrow \ldots\ldots\ldots + \left[-\frac{1}{3}-\frac{66}{100}\right]+\left[-\frac{1}{3}-\frac{67}{100}\right]+\ldots\ldots[\ \ ]$

= – 67 – 33 × 2
= – 67 – 66
= – 133

25. Let $f: R \to R$ be a continuously differentiable function such that f(2)=6 and $f'(x)=\frac{1}{48}$. If $\int_6^{f(x)} 4t^3\,dt=(x-2)\,g(x)$, then $\lim_{x\to 2} g(x)$ is equal to :

(1) 12 (2) 18 (3) 36 (4) 24

Sol. **2**

$$g(x)=\frac{\int_6^{f(x)} 4t^3 dt}{(x-2)}=\frac{4f^3(x)f'(x)}{1}=18$$

26. Let $\vec{a}=3\hat{i}+2\hat{j}+2\hat{k}$ and $\vec{b}=\hat{i}+2\hat{j}-2\hat{k}$ be two vectors. If a vector perpendicular to both the vectors $\vec{a}+\vec{b}$ and $\vec{a}-\vec{b}$ has the magnitude 12 then one such vector is :

(1) $4\left(-2\hat{i}-2\hat{j}+\hat{k}\right)$ (2) $4\left(2\hat{i}+2\hat{j}+\hat{k}\right)$ (3) $4\left(2\hat{i}-2\hat{j}-\hat{k}\right)$ (4) $4\left(2\hat{i}+2\hat{j}-\hat{k}\right)$\

Sol. **3**

$\bar{a}.\bar{b}=(4,4,0)=\vec{x}$

$(a-b)=(2,0,4)=\vec{y}$

$$\vec{v}=\vec{x}\times\vec{y}=\begin{vmatrix} i & j & k \\ 4 & 4 & 0 \\ 2 & 0 & 4 \end{vmatrix}$$

= $=i(16)-j(16)+k(-8)$

= $2\hat{i}-2\hat{j}-\hat{k}$

$\therefore\ \ \hat{v}=\left(\frac{2}{3},\frac{-2}{3},\frac{-1}{3}\right)$

$12\ \hat{v}=4(2,-2,-1)$

27. The number of solutions of the euqation 1+sin⁴ = cos²3x, $x \in \left[\frac{-5\pi}{2}, \frac{5\pi}{2}\right]$ is :

(1) 5 (2) 4 (3) 3 (4) 7

Sol. 1

$1 + \sin^4 x = \cos^2 3x$

$x \in \left[\frac{-5\pi}{2}, \frac{5\pi}{2}\right]$

by boundary coun^n
sinx = 0 and cos 3x = ± 1
x = – 2π, – π, 0, π, 2π

28. If $e^y+xy=e$, the ordered pair $\left(\frac{dy}{dx}, \frac{d^2y}{dx^2}\right)$ at x = 0 is equal to :

(1) $\left(\frac{1}{e}, \frac{1}{e^2}\right)$ (2) $\left(-\frac{1}{e}, \frac{1}{e^2}\right)$ (3) $\left(\frac{1}{e}, -\frac{1}{e^2}\right)$ (4) $\left(-\frac{1}{e}, -\frac{1}{e^2}\right)$

Sol. 2

$e^y + xy = e$

$= e^y.(y^1)^2 + e^y.y'' + y^1 + y^1 + xy'' = 0$

$= e\left(\frac{1}{e^2}\right) + e.y'' = 2 = 0$

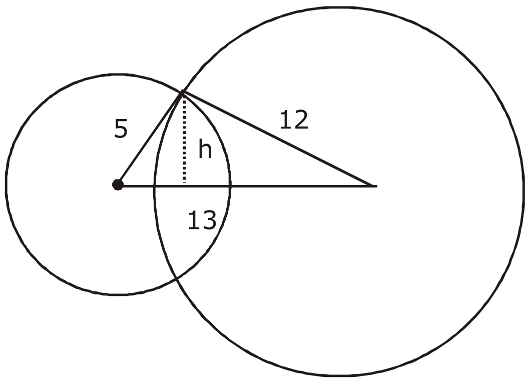
$= \frac{1}{e} + ey'' = \frac{2}{e}$

$= y'' = \frac{1}{e^2}$ $\left(-\frac{1}{e}, \frac{1}{e^2}\right)$

29. If the angle of intersection at a point where the two circles with radii 5cm and 12 cm intersect in 90^0, then the length (in cm) of their common chord is :

(1) $\frac{13}{5}$ (2) $\frac{120}{13}$ (3) $\frac{13}{2}$ (4) $\frac{60}{13}$

Sol. 2



$= \frac{1}{2}.5.12 = \frac{1}{2}.h.13$

$h = \frac{5.12}{13}$

$\therefore$ length of common chord $= \frac{120}{13}$

30. The coefficient of x^{18} in the product $(1+x)(1-x)^{10}(1+x+x^2)^9$ is :
(1) -84 (2) 126 (3) -126 (4) 84

Sol. 4

$(1+x)\ \underbrace{(1-x)^{10}}_{x^{11}}\ \underbrace{(1+x+x^2)^9}_{18}$

$(1+x^2)\ (1-x^3)^9$

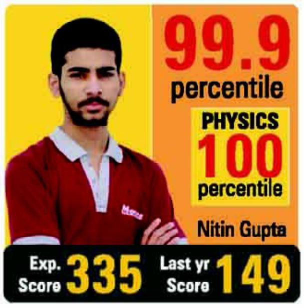
$\underbrace{(1+x^3)}_{18} - \underbrace{x^2(1-x^3)^9}_{1\times 6}$

${}^9C_6 = 84$

मोशन ने बनाया साधारण को असाधारण

JEE Main Result Jan'19

4 RESIDENTIAL COACHING PROGRAM (DRONA)
STUDENTS ABOVE 99.9 PERCENTILE



Total Students Above 99.9 percentile - **17**

Total Students Above 99 percentile - **282**

Total Students Above 95 percentile - **983**

% of Students Above 95 percentile $\frac{983}{3538}$ = **27.78%**

Scholarship on the Basis of 12th Class Result

Marks PCM or PCB	Hindi State Board	State Eng OR CBSE
70%-74%	30%	20%
75%-79%	35%	25%
80%-84%	40%	35%
85%-87%	50%	40%
88%-90%	60%	55%
91%-92%	70%	65%
93%-94%	80%	75%
95% & Above	90%	85%

New Batches for Class 11^{th} to 12^{th} pass
17 April 2019 & 01 May 2019

हिन्दी माध्यम के लिए पृथक बैच

Scholarship on the Basis of JEE Main Percentile

Score	JEE Mains Percentile	English Medium Scholarship	Hindi Medium Scholarship
225 Above	Above 99	Drona Free (Limited Seats)	
190 to 224	Above 97.5 To 99	100%	100%
180 to 190	Aboev 97 To 97.5	90%	90%
170 to 179	Above 96.5 To 97	80%	80%
160 to 169	Above 96 To 96.5	60%	60%
140 to 159	Above 95.5 To 96	55%	55%
74 to 139	Above 95 To 95.5	50%	50%
66 to 73	Above 93 To 95	40%	40%
50 to 65	Above 90 To 93	30%	35%
35 to 49	Above 85 To 90	25%	30%
20 to 34	Above 80 To 85	20%	25%
15 to 19	75 To 80	10%	15%

सैन्य कर्मियों के बच्चो के लिए 50% छात्रवृत्ति | **प्री-मेडिकल में छात्राओं को 50% छात्रवृत्ति**