JEE MAIN April'19

PAPER WITH SOLUTION

12 April 2019 _ Evening _ Maths

1. The tangents to the curve $y = (x-2)^2 - 1$ at its points of intersection with the line $x - y = 3$, intesect at the point :

(1) $\left(\frac{5}{2}, 1\right)$ (2) $\left(-\frac{5}{2}, -1\right)$ (3) $\left(-\frac{5}{2}, 1\right)$ (4) $\left(\frac{5}{2}, -1\right)$

Sol. **4**

C : $x^2 - 4x - y + 3 = 0$

Coc : $xh - 2(x+h) - \frac{1}{2}(y+k) + 3 = 0$ ...(1)

Given line $x - y = 3$ ...(2)

Compair Equation (1) and (2)

$$\frac{h-2}{1} = \frac{-\frac{1}{2}}{-1} = \frac{-2h - \frac{k}{2} + 3}{-3}$$

$$h - 2 = \frac{1}{2}$$

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

$$2h + \frac{k}{2} - 3 = \frac{3}{2}$$

$$\frac{k}{2} = 3 + \frac{3}{2} - 2\left(\frac{5}{2}\right)$$

$$\frac{k}{2} = \frac{9}{2} - \frac{10}{2}$$

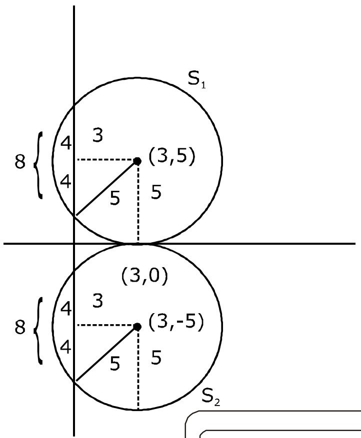
$$k = -1$$

$\Rightarrow (h, k) = (5/2, -1)$

2. A circle touching the x - axis at (3,0) and making an intercept of length 8 on the y - axis passes through the point :

(1) (1,5) (2) (2,3) (3) (3,10) (4) (3,5)

Sol. **3**



$S_1 : (x-3)^2+(y-5)^2=5^2$ & $S_2 : (x-3)^2+(y+5)^2=5^2$
Check option

3. If ${}^{20}C_1 + (2^2)\,{}^{20}C_2 + (3^2)\,{}^{20}C_3 + ...+(20^2)\,{}^{20}C_{20} = A(2^{\beta})$, then the ordered pair (A, β) is equal to :

(1) (420, 19) (2) (380,18) (3) (420,18) (4) (380,19)

Sol. 3

$S = {}^{20}C_1+(2^2)\,{}^{20}C_2+(3^2)\,{}^{20}C_3+--+(20^2)\,{}^{20}C_{20}$

$S = \sum_{r21}^{20} r^2\, {}^{20}C_r$

$S = 20 \sum_{r=1}^{20} r\, {}^{19}C_{r-1}$

$S = 20\,(\sum (r-1)\,{}^{19}C_{r-1} + {}^{19}C_{r-1})$

$S = \sum_{r=1}^{20} {}^{18}C_{r-2} + \sum_{r=1}^{20} {}^{19}C_{r-1}$

$S = 20\,(19.2^{18} + 2^{19})$

$S = 20\, 2^{18}\,(19+2)$

$S = 21.5.2^{20}$

$1S = 05.2^{20} = 210.2^{19} = 420.2^{18} = A2^{\beta}$

$\Rightarrow A = 420$

$\beta = 18$

4. The Boolean expression $\sim (p \Rightarrow (\sim q))$ is equivalent to :

(1) $p \vee q$ (2) $p \wedge q$ (3) $q \Rightarrow \sim p$ (4) $(\sim p) \Rightarrow q$

Sol. 2

p	q	~q	p→ ~q	~(p→ ~q)
T	T	F	F	T
T	F	T	T	F
F	T	F	T	F
F	F	T	T	F

p	q	$p \wedge q$
T	T	T
T	F	F
F	T	F
F	F	F

5. If $a_1, a_2, a_3, ...$ are in A.P. such that $a_1 + a_7 + a_{16} = 40$, then the sum of the first 15 terms of this A.P. is :

(1) 280 (2) 120 (3) 200 (4) 150

Sol. 3

$a_1+a_7+a_{16}=40$

$3a+6d+15d=40$

$3a+21d=40$

Sum of 1st 15terms

$\Rightarrow S = \frac{15}{2}[2a+14d]$

$\Rightarrow S = \frac{15}{2}\left|40.\frac{2}{3}\right|$

$\frac{3}{2}[2a+14d]=40$

$\Rightarrow$ S = 40x5

$\Rightarrow$S = 200

6. If [x] denotes the greatest integers $\le$x, thenthe system of linear equations [sinθ]x + [−cosθ]y = 0 & [cotθ]x + y = 0.

(1) have infinitely many solutions if $\theta \in \left(\frac{\pi}{2},\frac{2\pi}{3}\right)$ and has a unique solutions if $\theta \in \left(\pi,\frac{7\pi}{6}\right)$

(2) has a unique solution if $\theta \in \left(\frac{\pi}{2},\frac{2\pi}{3}\right)\cup\left(\pi,\frac{7\pi}{6}\right)$

(3) have infinitely, many solutions if $\theta \in \left(\frac{\pi}{2},\frac{2\pi}{3}\right)\cup\left(\pi,\frac{7\pi}{6}\right)$

(4) has a unique solution if $\theta \in \left(\frac{\pi}{2},\frac{2\pi}{3}\right)$ and have infinitely many solutions if $\theta \in \left(\pi,\frac{7\pi}{6}\right)$

Sol. **1**

x[Sinθ]+[-Cosθ]y=0

x[Cotθ]+y = 0

For ∞ Solu.

$$\Delta=\begin{vmatrix}[\text{Sin}\,\theta] & [\text{-Cos}\theta]\\ [\text{Cot}\,\theta] & 1\end{vmatrix}=0$$

$\Delta=[\text{Sin}\,\theta]\text{-}[\text{Cot}\theta][\text{-Cos}\theta]=0$

(i) $\theta\in\left(\frac{\pi}{2},\frac{2\pi}{3}\right)\Rightarrow\Delta=0$

& $\theta\in\left(\pi,\frac{7\pi}{6}\right)\Rightarrow\Delta\ne0$

7. For an initial screening of an admission test, a candidate is given fifty problems to solve. If the probability that the candidate can solve any problem is $\frac{4}{5}$, then the probability that he is unable to solve less than two problems is :

(1) $\frac{316}{25}\left(\frac{4}{5}\right)^{48}$ (2) $\frac{201}{5}\left(\frac{1}{5}\right)^{49}$ (3) $\frac{164}{25}\left(\frac{1}{5}\right)^{48}$ (4) $\frac{54}{5}\left(\frac{4}{5}\right)^{49}$

Sol. **4**

(50 Solve + 0 unsolve) + (49 Solve + 1unsolve)

$={}^{50}C_{50}\left(\frac{4}{5}\right)^{50}+{}^{50}C_{49}\left(\frac{4}{5}\right)^{49}.\frac{1}{5}$

$=\left(\frac{4}{5}\right)^{50}+50.\left(\frac{4}{5}\right)^{49}.\frac{1}{5}$

$=\left(\frac{4}{5}\right)^{50}+10.\left(\frac{4}{5}\right)^{49}$

$=\left(\frac{4}{5}+10\right)\left(\frac{4}{5}\right)^{49}$

$=\frac{54}{5}\left(\frac{4}{5}\right)^{49}$

8. The equation of a common tangent to the curves, $y^2 = 16x$ and $xy = -4$, is :

(1) $x + y + 4 = 0$ (2) $2x - y + 2 = 0$ (3) $x - 2y + 16 = 0$ (4) $x - y + 4 = 0$

Sol. **4**

$C_1: y^2=16x$ & $C_2: xy_2=-4$

T to C_1: $y = mx + \frac{4}{m}$ solve with $xy=-4$

$mx^2+\frac{4x}{m}+4=0$

For C.T. $\Rightarrow D = 0$

$\left(\frac{4}{m}\right)^2-4.m.4=0$

$\frac{1}{m^2}-m=0$

$m = 1$

C.T. y-x=4

9. let $z \in C$ with $Im(z) = 10$ and it satisfies $\frac{2z-n}{2z+n} = 2i - 1$ for some natural number n, then :

(1) n = 40 and Re(z) = 10 (2) n = 20 and Re(z) = 10

(3) n = 20 and Re(z) = – 10 (4) n = 40 and Re(z) = – 10

Sol. **4**

$Im(z) = 10$

$\frac{2z-n}{2z+n}+1=2i$

$\frac{2z-n+2z+n}{2z+n}=2i$

$\frac{2z}{2z+n}=i$

$2x+20i = 2xi + ni - 20$ Compair real & img. Part

$2x=-20$ $20 = 2x+n$

$x = -10$ & $n = 40$.

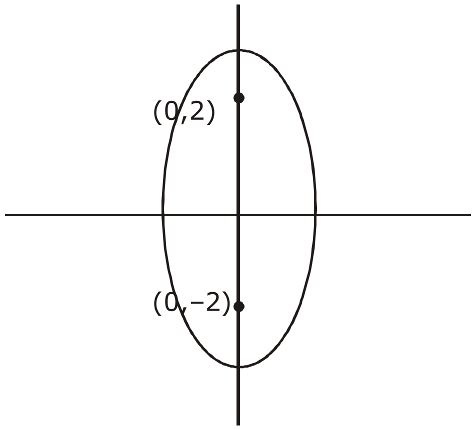
10. An ellipse, with foci at (0,2) and (0,–2) and minor axis of length 4, passes through which of the following points ?

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

Sol. **1**

$$\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$$

$$E:\ \frac{x^2}{4}+\frac{y^2}{8}=1$$



$$a^2=4$$
$$2be=4$$
$$e^2=1-\frac{a^2}{b^2}$$
$$b^2e^2=b^2-a^2$$
$$4=b^2-4$$
$$b^2=8$$

11. A value of $\theta\in(0,\pi/3)$, for which $\begin{vmatrix}1+\cos^2\theta & \sin^2\theta & 4\cos6\theta\\ \cos^2\theta & 1+\sin^2\theta & 4\cos6\theta\\ \cos^2\theta & \sin^2\theta & 1+4\cos6\theta\end{vmatrix}$ = 0, is :

(1) $\frac{\pi}{9}$ (2) $\frac{\pi}{18}$ (3) $\frac{7\pi}{24}$ (4) $\frac{7\pi}{36}$

Sol. **1**

$$\begin{vmatrix}1+\cos^2\theta & \text{Sin}^2\theta & 4\text{Cos}6\theta\\ \text{Cos}^2\theta & 1+\text{Sin}^2\theta & 4\text{Cos}6\theta\\ \text{Cos}^2\theta & \text{Sin}^2\theta & 1+4\text{Cos}6\theta\end{vmatrix}=0$$

$R_3\to R_3-R_1,\quad R_2\to R_2\text{-}R_1$

$$\begin{vmatrix}1+\cos^2\theta & \text{Sin}^2\theta & 4\text{Cos}6\theta\\ -1 & 1 & 0\\ -1 & 0 & 1\end{vmatrix}=0$$

$C_2\to C_2-C_1$

$$\begin{vmatrix}1+\text{Cos}^2\theta & 2 & 4\text{Cos}6\theta\\ -1 & 0 & 0\\ -1 & -1 & 1\end{vmatrix}=0$$

$$1[2+4\,\text{Cos}\,6\theta]=0$$

$$\text{Cos}6\,\theta=-\frac{1}{2}$$

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$$6\,\theta=2\frac{\pi}{3}\ ;\ \theta=\frac{\pi}{9}$$

12. Let $\alpha \in R$ and the three vectors $\vec{a} = \alpha\hat{i} + \hat{j} + 3\hat{k}$, $\vec{b} = 2\hat{i} + \hat{j} - \alpha\hat{k}$ and $\vec{c} = \alpha\hat{i} - 2\hat{j} + 3\hat{k}$. Then the set $S = \{\alpha : \vec{a}, \vec{b}$ and $\vec{c}$ are coplanar$\}$

(1) is empty
(2) contains exactly two numbers only one of which is positive
(3) is singleton
(4) contains exactly two positive numbers

Sol. **1**

$\vec{a}, \vec{b}, \vec{c}$ are coplaner

$[\overline{a}\ \overline{b}\ \overline{C}] = 0$

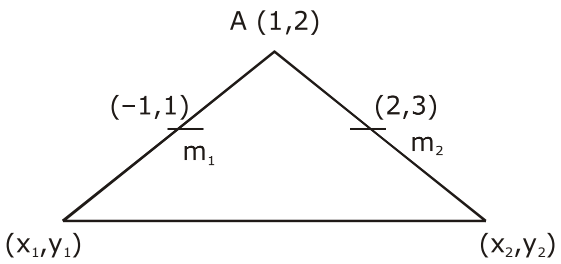
$$\begin{vmatrix} \alpha & 1 & 3 \\ 2 & 1 & -\alpha \\ \alpha & -2 & 3 \end{vmatrix} = 0$$

$\alpha(3-2\alpha)-1(6+\alpha^2)+3(-4-\alpha)=0$
$3\alpha-2\alpha^2-6-\alpha^2-12-3\alpha = 0$
$-3\alpha^2=18 = \alpha^2= -6$
$\alpha \in \phi$

13. a triangle has a vertex at (1,2) and the mid points of the two sides through it are (-1,1) and (2,3). Then the centroid of this triangle is :

(1) $\left(\frac{1}{3}, 1\right)$ (2) $\left(1, \frac{7}{3}\right)$ (3) $\left(\frac{1}{3}, \frac{5}{3}\right)$ (4) $\left(\frac{1}{3}, 2\right)$

Sol. **4**



$X_1=-3$ $x_2=3$
$y_1=0$ $y_2=4$

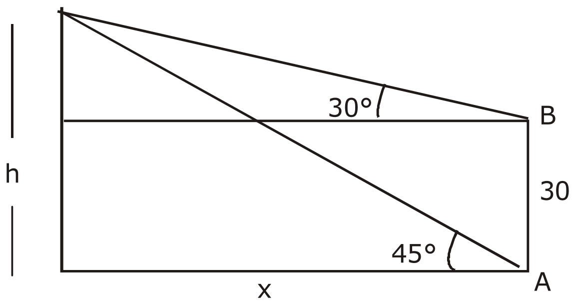
$G = \frac{x_1+x_2+1}{3}, \frac{y_1+y_2+2}{3}$

Centroid $G = \left(\frac{1}{3}, 2\right)$

14. The angle of elevation of the top of vertical tower standing, on a horizontal plane is observed to be 45° from a point A on the plane. Let B be the point 30 m vertically above the point A. If the angle of elevation of the top of the tower from B be 30°, then the distance (in m) of the foot of the tower from the point A is :

(1) $15\left(5-\sqrt{3}\right)$ (2) $15\left(3-\sqrt{3}\right)$ (3) $15\left(3+\sqrt{3}\right)$ (4) $15\left(1+\sqrt{3}\right)$

Sol. **3**



$$\frac{h}{x}=\tan 45 \quad \& \quad \frac{h-30}{x}=\tan 30$$

$$h=x=\frac{x-30}{x}=\frac{1}{\sqrt{3}}$$

$$\sqrt{3}\,x - 30\sqrt{3} = x$$

$$x=\frac{30\sqrt{3}}{\sqrt{3}-1}$$

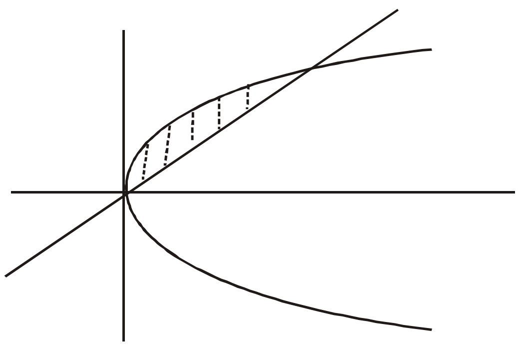
$$x = 15\,(\sqrt{3}+1)\sqrt{3}$$

$$x = 15\,(3+\sqrt{3})$$

15. If the area (in sq. units) bounded by the parabola $y^2 = 4\lambda x$ and the line $y = \lambda x$, $\lambda > 0$, is $\frac{1}{9}$, then λ is equal to :

(1) $4\sqrt{3}$ (2) 24 (3) 48 (4) $2\sqrt{6}$

Sol. **2**



Use fromula of Area

$$A = \left|\frac{8}{3} \quad \frac{a^2}{m^3}\right|$$

$$A = \left|\frac{8}{3} . \frac{\lambda^2}{\lambda^3}\right| = \frac{1}{9}$$

$$\frac{1}{\lambda}.\frac{8}{3} = \frac{1}{9}$$

$\lambda = 24$

16. Let f(x) = 5 – |x – 2| and g(x) = |x + 1|, x ∈ R. If f(x) attains maximum value at α and g(x) attains minimum value at β,then $\lim\limits_{x\to-\alpha\beta} \frac{(x-1)(x^2-5x+6)}{x^2-6x+8}$ is equal to

(1) 3/2 (2) –3/2 (3) –1/2 (4)1/2

Sol. **4**

$f(x) = 5 - |x-2|$ & $g(x) = |x-1|$

$\alpha = 2$ $\beta = -1$

$$\underset{x\to-\beta\alpha}{\alpha t} \frac{(x-1)(x-3)(x-2)}{(x-4)(x-2)}$$

$$\underset{x\to2}{\alpha t} \frac{(x-1)(x-3)}{(x-4)} = \frac{1.(-1)}{-2} = \frac{1}{2}$$

17. A straight line L at a distance of 4 units from the origin makes positive intercepts on the coordinate axes and the perpendicular from the origin to this line makes an angle of 60° with the line x + y = 0. Then an equation of the line L is :

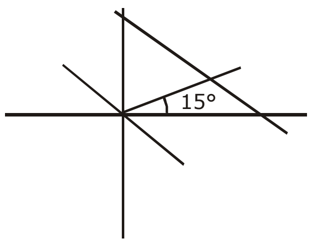
(1) $\left(\sqrt{3}-1\right)x+\left(\sqrt{3}+1\right)y=8\sqrt{2}$

(2) $x+\sqrt{3}y=8$

(3) $\left(\sqrt{3}+1\right)x+\left(\sqrt{3}-1\right)y=8\sqrt{2}$

(4) $\sqrt{3}x+y=8$

Sol. **3**



L : x Cos15+ysin15 = 4

$$L : x.\frac{\sqrt{3}+1}{2\sqrt{2}} + y\frac{\sqrt{3}-1}{2\sqrt{2}} = 4$$

$$L : \left(\sqrt{3}+1\right)x + \left(\sqrt{3}-1\right)y = 8\sqrt{2}$$

18. Let $\alpha \in (0, \pi/2)$ be fixed. If the integral $\int \frac{\tan x + \tan\alpha}{\tan x - \tan\alpha} dx =$ A(x) cos2α + B(x) sin2α + C, where C is a constant of integration, then the functions A(x) and B(x) are respectively :

(1) $x + \alpha$ and $\log_e |\sin(x - \alpha)|$
(2) $x - \alpha$ and $\log_e |\sin(x - \alpha)|$
(3) $x + \alpha$ and $\log_e |\sin(x + \alpha)|$
(4) $x - \alpha$ and $\log_e |\cos(x - \alpha)|$

Sol. **2**

$\int \frac{\tan x + \tan\alpha}{\tan x - \tan\alpha} d\alpha$

$\int \frac{\sin(x+\alpha)}{\text{Sin}(x-a)} d\alpha$

$x-\alpha = t$

$\int \frac{\sin(t+2\alpha)}{\text{Sin}t} dt$

$\int \text{Cos}2\alpha dt + \int \text{Cott.Sin}2\alpha dt$

(x-α) Cos 2α + Sin 2α . In Sin |x-α| + C
A (x) = (x-α) & B (x) = In Sin |x-α|

19. The length of the perpendicular drawn from the point (2,1,4) to the plane containing the lines $\vec{r} = (\hat{i} + \hat{j}) + \lambda(\hat{i} + 2\hat{j} - \hat{k})$ and $\vec{r} = (\hat{i} + \hat{j}) + \mu(-\hat{i} + \hat{j} - 2\hat{k})$ is :

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

Sol. **2**

$$\bar{n}_p = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & 2 & -1 \\ -1 & 1 & -2 \end{vmatrix} = \langle -3, +3, 3 \rangle$$

A : (1,1,10)
P : -3 (x-1) + 3 (y-1) + 3 (Z) = 0
P : -3x + 3y + 3z + 3 - 3 = 0
P : x- y -z = 0
Distance from (2,1,4)

$$d = \left| \frac{2-1-4}{\sqrt{1+1+1}} \right| = \sqrt{3}$$

20. The derivative of $\tan^{-1}\left(\frac{\sin x - \cos x}{\sin x + \cos x}\right)$, with respect to $\frac{x}{2}$, where $\left(x \in \left(0, \frac{\pi}{2}\right)\right)$ is:

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

Sol. **3**

Let $f(x) = \tan^{-1}\left(\frac{1-\text{Cot}x}{1+\text{Cot}x}\right) \quad x \in \left(0, \frac{\pi}{2}\right)$

$f(x) = -\tan^{-1}\left(\frac{1-\tan x}{1+\tan x}\right) = -\tan^{-1}\left(\tan\left(\frac{\pi}{4}-x\right)\right)$

$f(x) = -\left(\frac{\pi}{4}-x\right)$

$f(x) = x - \pi/4$ & $g(x) = x/2$

$\frac{df(x)}{dg(x)} = \frac{1}{1/2} = 2$

21. A palne which bisects the angle between the two given planes 2x-y+2z-4=0 and x+2y+2z-2=0, passes through the point :

(1) (1,-4,1) (2) (2,4,1) (3) (1,4,-1) (4) (2,-4,1)

Sol. **4**

$B : \left|\frac{2x-y+2z-y}{3}\right| = \left|\frac{x-2y+2z-2}{3}\right|$

(+) B_1 : 2x- y + 2z- 4 = x + 2y + 2z - 2
B_1 : x - 3y - 2 = 0

(-) B_2 : 2x-y + 2z - 4 = -x - 2y - 2z + 2
B_2 : 3x + y + 4z - 6 = 0

Now check Option

22. The general solution of the differential equation $(y^2 - x^3)dx - xydy = 0 (x \neq 0)$ is :(where c is a constant of integration)

(1) $y^2 - 2x^2 + cx^3 = 0$ (2) $y^2 - 2x^3 + cx^2 = 0$ (3) $y^2 + 2x^2 + cx^3 = 0$ (4) $y^2 + 2x^3 + cx^2 = 0$

Sol. **4**

$(y^2-x^3)dx - xydy = 0$

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

let $y^2 = t$

$\frac{1}{2}\frac{dt}{dx} = \frac{t-x^3}{x}$

$\frac{dt}{dx} - \frac{2t}{x} = -2x^2$ LDE

I.f = $e^{\int \frac{-2}{x}dx = \frac{1}{x^2}}$

$t\frac{1}{x^2} = \int -2x^2 \frac{1}{x^2} dx$

$y^2/x^2 = -2x + C$

$y^2+2x^3+Cx^2=0$

23. A group of students comprises of 5 boys and n girls. If the number of ways, in which a team of 3 st-udents can randomly be selected from this group such that there is at least one boy and at least one girl in each team, is 1750, then is equal to :

(1) 25 (2) 24 (3) 27 (4) 28

Sol. **1**

5B + nG

$^5C_1.^nC_2 + {^5C_2}.^nC_1 = 1750$

$\frac{5n(n-1)}{2} + 10n = 1750$

$5n^2 - 5n + 20n = 3500$

$5n^2 + 15n - 3500 = 0$

$n^2 + 3n - 700 = 0$

n = 25

24. Let A, B and C be sets such that $\phi \neq A \cap B \subseteq C$. Then which of the following statements is not true ?

(1) $B \cap C \neq \phi$ (2) If $(A-C) \subseteq B$, then $A \subseteq B$ (3) $(C \cup A) \cap (C \cup B) = C$ (4) If $(A-B) \subseteq C$, then $A \subseteq C$

Sol. **2**

Let A : $\{1, 2, 3\}$

B : $\{3, 4, 5\}$

C : $\{1, 2, 3, 4, 5\}$

Now $\phi \neq A \cap B \subseteq C$

(i) $B \cap C \neq \phi$ (True)

(ii) It $A - C \subseteq B$ then $A \subseteq B$ (False)

(iii) $(C \cup A) \cap (C \cup B) = C \cap C = C$ (True)

(iv) $A - B \subseteq C \Rightarrow A \subseteq C$ (True)

25. $\lim_{x \to 0} \frac{x + 2\sin x}{\sqrt{x^2 + 2\sin x + 1} + \sqrt{\sin^2 x - x + 1}}$ is :

(1) 1 (2) 3 (3) 6 (4) 2

Sol. **4**

$$\mathop{Lt}_{x \to 0} \frac{x + 2\text{Sin}x}{(x^2 + 2\text{Sin}x + 1) - (\text{Sin}^2 x - x + 1)}\left(\sqrt{x^2 + 2\sin x + 1} + \sqrt{\sin^2 x - x + 1}\right)$$

$$\mathop{Lt}_{x \to 0} \frac{x + 2\text{Sin}x}{x^2 + x + 2\text{Sin}x - \text{Sin}^2 x}\left(\sqrt{x^2 + 2\sin x + 1} + \sqrt{\sin^2 x - x + 1}\right)$$

$$\mathop{Lt}_{x \to 0} \left(\frac{1 + 2\frac{\sqrt{\text{Sin}x}}{x}}{x + 1 + 2\frac{\text{Sin}x}{x} - \frac{\text{Sin}^2 x}{x^2}x}\right)\left(\sqrt{x^2 + 2\sin x + 1} + \sqrt{\sin^2 x - x + 1}\right)$$

$= \frac{1+2}{1+2}(2)$

$= 2$

26. The term independent of x in the expansion of $\left(\frac{1}{60}-\frac{x^8}{81}\right)\left(2x^2-\frac{3}{x^2}\right)^6$ is equal to :

(1) 36 (2) -108 (3) -72 (4) -36

Sol. **4**

$= \text{Coff. of } X^0 \text{ in y} \left(\frac{1}{60}-\frac{x^8}{81}\right)\left(2x^2-\frac{3}{x^2}\right)^6$

$= \text{Coff of } X^0 \text{ in } \frac{1}{60}\left(2x^2-\frac{3}{x^2}\right)^6 + \text{Coff of } X^{-8} \text{ in } \left(\frac{-1}{81}(2x^2\frac{-3}{x^2})\right)^6$

$= \frac{1}{60}6_{C_3}2^3(-3)^3 - \frac{1}{81}6_{C_5}(2)^1(-3)^5$

$= \frac{1}{60}\text{x20x8x27} + \frac{1}{81}\text{6x2x3x3x3x3x3}$

= -72 + 36

= -36

27. A value of α such that $\int_{\alpha}^{\alpha+1}\frac{dx}{(x+\alpha)(x+\alpha+1)} = \log_e\left(\frac{9}{8}\right)$ is:

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

27. **2**

$\int_{\alpha}^{\alpha+1}\frac{d\alpha}{(x+\alpha)(x+\alpha+1)}$

$I = \int_{\alpha}^{\alpha+1}\frac{(x+\alpha+1)-(x+\alpha)}{(x+\alpha)(x+\alpha+1)}dx$

$I = \int_{\alpha}^{\alpha+1}\frac{1\,dx}{x+\alpha} - \int_{\alpha}^{\alpha+1}\frac{1}{(x+\alpha+1)}dx$

$\left[\ln(x+\alpha)\right]_{\alpha}^{\alpha+1} - \left[\ln(x+\alpha+1)\right]_{\alpha}^{\alpha+1}$

$I = \ln\left(\frac{2\alpha+1}{2\alpha}\right) - \ln\left(\frac{2\alpha+2}{2\alpha+1}\right)$

$I = \ln\left(\frac{(2\alpha+1)^2}{2\alpha(2\alpha+2)}\right) = 1n\left(\frac{9}{8}\right) \Rightarrow \alpha = 1 \;\&\; \alpha = -2$

28. Let S be the set of all $\alpha \in R$ such that the equation, cos2x+ αsinx= 2α-7 has a solution. Then S is equal to :

(1) [3,7] (2) [1,4] (3) [2,6] (4) R

Sol. **3**

Cos2x+ αSinx $= 2\alpha - 7$

1-2Sin²x + αSinx $= 2\alpha - 7$

Let Sinx = t ,   where $-1 \le t \le 1$

$2t^2 - \alpha t + 2\alpha - 8 = 0$

$f(1)\ f(-1) \le 0$

$(2-\alpha+2\alpha-8)(2+\alpha+2\alpha-8) \le 0$

$(\alpha-6)(3\alpha-6) \le 0$

$(\alpha-6)(\alpha-2) \le 0$

$2 \le \alpha \le 6$

29. A person throws two fair dice. He wins Rs. 15 for throwing a doublet (same numbers on the two dice), wins Rs.12 when the throw results in the sum of 9, and loses Rs.6 for any other outcome on the throw Then the expected gain/loss (in Rs.) of the person is :

(1) $\frac{1}{2}$ gain   (2) $\frac{1}{2}$ loss   (3) 2 gain   (4) $\frac{1}{4}$ loss

Sol. **2**

Prize win = 15   When doublet ocurr

win = 12   When sum 9

wins = 6   When other any out come

Exp. = $\frac{1}{36}\{6x15 + 4x12 - 26x6\}$

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

30. If α, β and γ are three consecutive terms of a non-constant G.P. such that the equation $\alpha x^2 + 2\beta x + \gamma = 0$ and $x^2+x-1=0$ have a common root, then $\alpha(\beta+\gamma)$ is equal to :

(1) 0   (2) $\alpha\beta$ (3) $\beta\gamma$ (4) $\alpha\gamma$

Sol. **3**

$\alpha x^2 + 2\beta + \gamma = 0$ $x^2 + x - 1 = 0$ $\frac{-1+\sqrt{5}}{2}$

$\frac{-1-\sqrt{5}}{2}$

Let Common Root 'a'   Since α, β, r are in G.P

$\frac{A}{R}, A, AR$

$\alpha a^2 + 2\beta a + \gamma = 0$

$a^2+a-1= 0$

$\frac{A}{R}a^2 + 2A\,a + AR = 0$

$a^2 + 2Ra + R^2 = 0$

$(a+R)^2=0$

$a=-R$ Now $R^2-R-1=0$

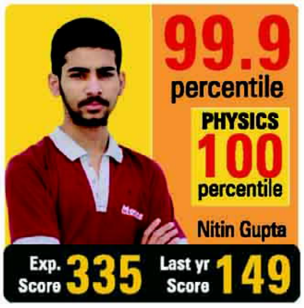
$1+R = R^2$

Now $\alpha(\beta+\gamma)$

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 11th to 12th 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