QUESTION PAPER WITH SOLUTION

MATHEMATICS _ 5 Sep. _ SHIFT - 2

MOTION™

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Q.1 If x=1 is a critical point of the function $f(x)=(3x^2+ax-2-a)e^x$, then:

(1) x=1 is a local minima and $x=-\frac{2}{3}$ is a local maxima of f.

(2) x=1 is a local maxima and $x=-\frac{2}{3}$ is a local minima of f.

(3) x=1 and $x=-\frac{2}{3}$ are local minima of f.

(4) x=1 and $x=-\frac{2}{3}$ are local maxima of f.

Sol. **1**

$f(x) = (3x^2+ax-2-a)e^x$

$f'(x) = (3x^2+ax-2-a)e^x + (6x+a)e^x = 0$

$e^x\left[3x^2+(a+6)x-2\right]=0$

at x = 1, 3 +a+6 - 2 = 0

a=–7

$f(x) = (3x^2 - 7x + 5)e^x$

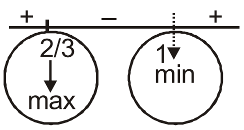
$f'(x) = (6x-7)e^x+(3x^2-7x+5)e^x$

$= e^x(3x^2-x-2) = 0$

$= 3x^2 - 3x + 2x - 2 = 0$

$= (3x+2)(x-1) = 0$

x = 1, -2/3



Q.2 $\lim\limits_{x\to 0}\dfrac{x\left(e^{\left(\sqrt{1+x^2+x^4}-1\right)/x}-1\right)}{\sqrt{1+x^2+x^4}-1}$

(1) is equal to $\sqrt{e}$ (2) is equal to 1 (3) is equal to 0 (4) does not exist

Sol. **2**

$\lim\limits_{x\to 0}\dfrac{x\left[e^{\left(\sqrt{1+x^2+x^4}-1\right)/x}-1\right]}{\left(\sqrt{1+x^2+x^4}-1\right)}$

$$\lim_{x\to 0}\frac{x\left[e^{\left[\frac{\left(\sqrt{1+x^2+x^4}\right)^2-1}{x\times 2}\right]}-1\right]\times\left(\sqrt{1+x^2+x^4}+1\right)}{\left(x^2+x^4\right)}$$

$$x\lim_{x\to\infty}\frac{e^{\left(\frac{x^3+x}{2}\right)}-1}{\left(\frac{x^3+x}{2}\right)\times 2}\times 2$$

$= 1$

Q.3 The statement $(p\to(q\to p))\to(p\to(p\vee q))$ is:

(1) equivalent to $(p\vee q)\wedge(\sim p)$

(2) equivalent to $(p\wedge q)\vee(\sim p)$

(3) a contradiction

(4) a tautology

Sol. **4**

p	$q\to p$	$p\to(q\to p)$
T	T	T
T	T	T
F	F	T
F	T	T

$\Rightarrow$ (Tautology)

p	$p\vee q$	$p\to(p\vee q)$
T	T	T
T	T	T
F	T	T
F	F	T

Q.4 If $L=\sin^2\left(\frac{\pi}{16}\right)-\sin^2\left(\frac{\pi}{8}\right)$ and $M=\cos^2\left(\frac{\pi}{16}\right)-\sin^2\left(\frac{\pi}{8}\right)$, then:

(1) $M=\frac{1}{2\sqrt{2}}+\frac{1}{2}\cos\frac{\pi}{8}$

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

(3) $L=-\frac{1}{2\sqrt{2}}+\frac{1}{2}\cos\frac{\pi}{8}$

(4) $L=\frac{1}{4\sqrt{2}}-\frac{1}{4}\cos\frac{\pi}{8}$

Sol. **1**

$\ell = \sin\left(\frac{3\pi}{16}\right)\sin\left(\frac{-\pi}{16}\right)$

$\ell = \frac{-1}{2}\left[\cos\frac{\pi}{8} - \cos\frac{\pi}{4}\right]$

$\ell = \frac{1}{2\sqrt{2}} - \frac{1}{2}\cos\frac{\pi}{8}$

$M = \cos\left(\frac{3\pi}{16}\right)\cos\left(\frac{\pi}{16}\right)$

$M = \frac{1}{2}\left[\cos\frac{\pi}{4} + \cos\frac{\pi}{8}\right]$

$M = \frac{1}{2\sqrt{2}} + \frac{1}{2}\cos\frac{\pi}{8}$ ....(1)

Q.5 If the sum of the first 20 terms of the series $\log_{(7^{1/2})} x + \log_{(7^{1/3})} x + \log_{(7^{1/4})} x + \cdots$ is 460, then x is equal to:

(1) $7^{1/2}$ (2) 7^2 (3) e^2 (4) $7^{46/21}$

Sol. **2**

$(2 + 3 + 4 + \ldots + 21)\log_7 x = 460$

$\Rightarrow \frac{20\times(21+2)}{2}\log_7 x = 460$

$\Rightarrow 230\log_7 x = 460 \Rightarrow \log_7 x = 2 \Rightarrow x = 7^2$

Q.6 There are 3 sections in a question paper and each section contains 5 questions. A candidate has to answer a total of 5 questions, choosing at least one question from each section. Then the number of ways, in which the candidate can choose the questions, is:

(1) 2250 (2) 2255 (3) 1500 (4) 3000

Sol. **1**

6 case

S—1	S—2	S—3
1,2,3,4,5	1,2,3,4,5	1,2,3,4,5
1	1	3
1	2	2
1	3	1
2	2	1
2	1	2
3	1	1

$3(5_{c_1} \times 5_{c_1} \times 5_{c_3}) + 3(5_{c_1} \times 5_{c2} \times 5_{c_2})$ = $3(25 \times 10) + (100 \times 5)3 = 750 + 1500 = 2250$

Q.7 If the mean and the standard deviation of the data 3,5,7,a,b are 5 and 2 respectively, then a and b are the roots of the equation:

(1) $x^2-20x+18=0$ (2) $x^2-10x+19=0$ (3) $2x^2-20x+19=0$ (4) $x^2-10x+18=0$

Sol. 2

$$\text{S.D.} = \sqrt{\frac{\Sigma x_i^2}{n} - (\bar{x})^2}$$

$$(2)^2 = \frac{83 + a^2 + b^2}{5} - \left(\frac{15 + a + b}{5}\right)^2$$

$$4 = \frac{83 + a^2 + b^2}{5} - 25$$

$29 \times 5 - 83 = a^2+b^2 \Rightarrow a^2+b^2 = 62$ (1)

$\frac{a+b+15}{5} = 5 \quad \Rightarrow \boxed{a+b=10}$

$2ab = 100 - 62 = 38$

$\boxed{ab = 19}$ (2)

Q.8 The derivative of $\tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right)$ with respect to $\tan^{-1}\left(\frac{2x\sqrt{1-x^2}}{1-2x^2}\right)$ at $x = \frac{1}{2}$ is:

(1) $\frac{2\sqrt{3}}{3}$ (2) $\frac{2\sqrt{3}}{5}$ (3) $\frac{\sqrt{3}}{12}$ (4) $\frac{\sqrt{3}}{10}$

Sol. 4

$x = \tan\theta$

$$u = \tan^{-1}\left(\frac{\sec\theta - 1}{\tan\theta}\right) = \tan^{-1}(\tan\theta/_2) = \frac{\theta}{2} = \frac{\tan^{-1}x}{2}$$

$$v = \tan^{-1}\left(\frac{2\sin\theta\cos\theta}{\cos 2\theta}\right) = 2\theta$$

$= 2\sin^{-1}x$

$$\frac{du}{dv} = \frac{1}{2(1+x^2)} \times \frac{\sqrt{1-x^2}}{2}$$

$$= \frac{\sqrt{3}}{2 \times 2} \times \frac{4}{5 \times 2} = \frac{\sqrt{3}}{10}$$

Q.9 If $\int \frac{\cos\theta}{5+7\sin\theta-2\cos^2\theta}d\theta = A\log_e|B(\theta)|+C$ where C is a constant of integration, then $\frac{B(\theta)}{A}$ can be:

(1) $\frac{5(2\sin\theta+1)}{\sin\theta+3}$ (2) $\frac{5(\sin\theta+3)}{2\sin\theta+1}$ (3) $\frac{2\sin\theta+1}{\sin\theta+3}$ (4) $\frac{2\sin\theta+1}{5(\sin\theta+3)}$

Sol. **1**

$$\int \frac{\cos\theta}{5+7\sin\theta-2+2\sin^2\theta}d\theta$$

$$\int \frac{dt}{2t^2+7t+3}$$

$$= \frac{1}{2}\int \frac{dt}{t^2+\frac{7t}{2}+\frac{3}{2}} = \frac{1}{2}\int \frac{dt}{t^2+\frac{7}{2}t+\left(\frac{7}{4}\right)^2-\frac{49}{16}+\frac{24}{16}}$$

$$= \frac{1}{2}\int \frac{dt}{(t+7/4)^2-(5/4)^2}$$

$$\frac{1}{2}\times\frac{1}{2\cdot\frac{5}{4}}\ln\left|\left[\frac{t+7/4-5/4}{t+7/4+5/4}\right]\right|$$

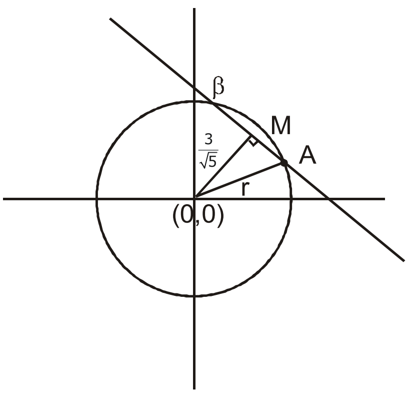
$$\frac{1}{5}\ln\left|\left(\frac{\sin\theta+1/2}{\sin\theta+3}\right)\right|+C$$

$$\frac{B(\theta)}{A} = 5\left(\frac{2\sin\theta+1}{\sin\theta+3}\right)$$

Q.10 If the length of the chord of the circle, $x^2+y^2 = r^2 (r>0)$ along the line, $y-2x=3$ is r, then r^2 is equal to:

(1) 12 (2) $\frac{24}{5}$ (3) $\frac{9}{5}$ (4) $\frac{12}{5}$

Sol. **4**



$AB = 2\sqrt{r^2 - 9/5} = r$

$r^2 - 9/5 = \frac{r^2}{4}$

$3r^2/4 = 9/5$

$\boxed{r^2 = \frac{12}{5}}$

Q.11 If α and β are the roots of the equation, $7x^2-3x-2=0$, then the value of $\frac{\alpha}{1-\alpha^2} + \frac{\beta}{1-\beta^2}$ is equal to:

(1) $\frac{27}{32}$ (2) $\frac{1}{24}$ (3) $\frac{27}{16}$ (4) $\frac{3}{8}$

Sol. 3

$\alpha + \beta = 3/7$, $\alpha\beta = -2/7$

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

$$\frac{\frac{3}{7} + \frac{2}{7} \times \frac{3}{7}}{1 - \left\{\frac{9}{49} + \frac{4}{7}\right\} + \frac{4}{49}}$$

$$\frac{\left(\frac{21+6}{49}\right)}{\frac{16}{49}} \Rightarrow \frac{27}{16}$$

Q.12 If the sum of the second, third and fourth terms of a positive term G.P. is 3 and the sum of its sixth, saventh and eighth terms is 243, then the sum of the first 50 terms of this G.P. is:

(1) $\frac{2}{13}(3^{50}-1)$ (2) $\frac{1}{26}(3^{49}-1)$ (3) $\frac{1}{13}(3^{50}-1)$ (4) $\frac{1}{26}(3^{50}-1)$

Sol. 4

$$\frac{ar + ar^2 + ar^3}{ar^5 + ar^6 + ar^7} = \frac{3}{243}$$

$$\frac{1 + r + r^2}{r^4(1 + r + r^2)} = \frac{1}{81}$$

$\boxed{r = 3}$

$a(3+9+27) = 3$

$a = \frac{3}{39} = \boxed{\frac{1}{13}}$

$S_{50} = a\left(\frac{r^{50}-1}{r-1}\right)$

$= \frac{1}{13}\left\{\frac{3^{50}-1}{2}\right\}$.........(4)

Q.13 If the line y=mx+c is a common tangent to the hyperbola $\frac{x^2}{100} - \frac{y^2}{64} = 1$ and the circle $x^2+y^2=36$, then which one of the following is true?

(1) $4c^2=369$ (2) $c^2=369$ (3) 8m+5=0 (4) 5m=4

Sol. **1**

$c = \pm\sqrt{a^2m^2 - b^2}$

$c = \pm\sqrt{100m^2 - 64}$

$y = mx \pm\sqrt{100m^2 - 64}$

$d|_{(0,0)} = 6$

$\left|\frac{\sqrt{100m^2 - 64}}{\sqrt{m^2+1}}\right| = 6$

$100m^2 - 64 = 36m^2 + 36$

$64m^2 = 100$

$m = 10/8$

$c^2 = 100 \times \frac{100}{64} - 64 \Rightarrow \frac{(164)(36)}{64}$ $\boxed{4c^2 = 369}$

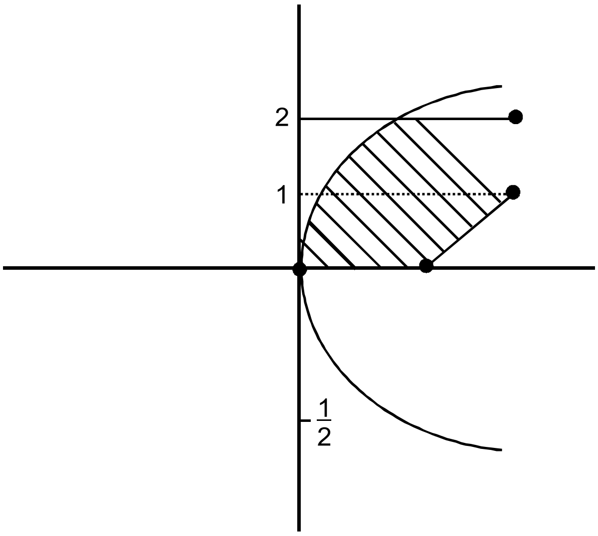
Q.14 The area (in sq. units) of the region $A = \{(x, y) : (x-1)[x] \le y \le 2\sqrt{x}, 0 \le x \le 2\}$ where [t] denotes the greatest integer function, is:

(1) $\frac{4}{3}\sqrt{2} - \frac{1}{2}$ (2) $\frac{8}{3}\sqrt{2} - \frac{1}{2}$ (3) $\frac{8}{3}\sqrt{2} - 1$ (4) $\frac{4}{3}\sqrt{2} + 1$

Sol. **2**

$y = f(x) = (x - 1)[x] = \begin{cases} 0 & 0 \le x < 1 \\ x-1 & 1 \le x < 2 \\ 2(x-1) & x = 2 \end{cases}$

$y^2 \le 4x$



$$\int_0^1 \left(2\sqrt{x}-0\right)+\int_1^2\left(2\sqrt{x}-(x-1)\right)$$

$$\frac{2}{3}\times 2x^{3/2}\Big|_0^1+\left(\frac{4}{3}x^{3/2}-\frac{x^2}{2}+x\right)_1^2$$

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

$$\frac{4}{3}+\frac{8\sqrt{2}}{3}-\frac{4}{3}-\frac{1}{2}=\frac{8\sqrt{2}}{3}-\frac{1}{2}$$

Q.15 If a+x=b+y=c+z+1, where a,b,c,x,y,z are non-zero distinct real numbers. then $\begin{vmatrix} x & a+y & x+a \\ y & b+y & y+b \\ z & c+y & z+c \end{vmatrix}$ is equal to:

(1) y(a–b) (2) 0 (3) y(b–a) (4) y(a–c)

Sol. **1**

$$\begin{vmatrix} x & a & x+a \\ y & b & y+b \\ z & c & z+c \end{vmatrix}+\begin{vmatrix} x & y & x+a \\ y & y & y+b \\ z & y & z+c \end{vmatrix}$$

$$\begin{vmatrix} x & y & a \\ y & y & b \\ z & y & c \end{vmatrix}\Rightarrow y\begin{vmatrix} x & 1 & a \\ y & 1 & b \\ z & 1 & c \end{vmatrix}$$

$$y\begin{vmatrix} x & 1 & a \\ y-x & 0 & b-a \\ z-x & 0 & c-a \end{vmatrix}$$

$$yx \times 0 - 1\{(y-x)(c-a)-(b-a)(z-x)\} + a \times 0\}$$

$$y[bz - bx - az + ax - (cy - ay - cx + ax)]$$

$$y[bz - bx - az - cy + ay + cx]$$

$$y[b(z-x) + a(y-z) + c(x-y)]$$

$$y[b\{a-c-1\} + a(c-b+1) + c(b-a)]$$

$$y[ab - bc - b + ac - ab + a + bc - ac]$$

$$\boxed{y(a-b)}$$

Q.16 If for some $\alpha \in R$, the lines $L_1 : \frac{x+1}{2} = \frac{y-2}{-1} = \frac{z-1}{1}$ and $L_2 : \frac{x+2}{\alpha} = \frac{y+1}{5-\alpha} = \frac{z+1}{1}$ are coplanar, then the line L_2 passes through the point:

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

Sol. **1**

A (-1,2,1), B(-2,-1, -1)

$$[\vec{AB}\ \vec{b_1}\ \vec{b_2}] = 0$$

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

$-1(-1+\alpha-5) + 3(2-\alpha)-2(10-2\alpha+\alpha)=0$

$6-\alpha + 6-3\alpha + 2\alpha - 20 = 0$

$-8 - 2\alpha = 0$

$$\boxed{\alpha = -4}$$

$$L_2 : \frac{x+2}{-4} = \frac{y+1}{9} = \frac{z+1}{1}$$

any point on L_2 is

$(-4\lambda-2, 9\lambda-1, \lambda-1) = A$

Q.17 The value of $\left(\frac{-1+i\sqrt{3}}{1-i}\right)^{30}$ is:

(1) $2^{15}i$ (2) -2^{15} (3) $-2^{15}i$ (4) 6^5

Sol. **3**

$$\left(\frac{-1+i\sqrt{3}}{1-i}\right)^{30} \Rightarrow \left[\left(\frac{-1+i\sqrt{3}}{2}\right)(1+i)\right]^{30}$$

$$\omega^{30}(1+i)^{30} = 2^{15}(-i)$$

Q.18 Let y=y(x) be the solution of the differential equation $\cos x\frac{dy}{dx} + 2y\sin x = \sin 2x,\ x \in \left(0, \frac{\pi}{2}\right)$.

If $y(\pi/3) = 0$, then $y(\pi/4)$ is equal to:

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

Sol. **2**

$\frac{dy}{dx} + (2\tan x)y = 2\sin x$

I.F. = $e^{2\ln(\sec x)} = \sec^2 x$

$y(\sec^2 x) = 2\int \frac{\sin x}{\cos^2 x}dx$

$= 2\int \sec x \tan x\, dx = 2\sec x + c$

$y\left(\frac{\pi}{3}\right) = 0$

0 = 2 × 2 + c = C = -4

$y(\sec^2 x) = 2\sec x - 4$

x = $\pi/4$

2y = $2\sqrt{2} - 4$

y = $\boxed{\sqrt{2}-2}$

Q.19 If the system of linear equations

$x+y+3z=0$

$x+3y+k^2z=0$

$3x+y+3z=0$

has a non-zero solution (x,y,z) for some $k \in R$, then $x + \left(\frac{y}{z}\right)$ is equal to:

(1) –9 (2) 9 (3) –3 (4) 3

Sol. **3**

$$\begin{vmatrix} 1 & 1 & 3 \\ 1 & 3 & k^2 \\ 3 & 1 & 3 \end{vmatrix} = 0$$

$(9-k^2)-(3-3k^2) + 3(-8)=0$

$9-k^2-3+3k^2 - 24 = 0$

$2k^2-18 = 0$

$K^2 = 9$

$\boxed{K = 3, -3}$

$$\begin{aligned} x+y+3z&=0 \\ x+3y+9z&=0 \\ \hline 2y+6z&=0 \end{aligned}$$

$\boxed{y = -3z}$

$\boxed{y / z = -3}$

$2x=0$

$\boxed{x = 0}$

$$x + \left(\frac{y}{z}\right) = -3$$

Q.20 Which of the following points lies on the tangent to the curve $x^4e^y + 2\sqrt{y+1} = 3$ at the point (1,0)?

(1) (2,6) (2) (2,2) (3) (–2,6) (4) (–2,4)

Sol. **3**

$$4x^3e^y + x^4e^yy' + \frac{2y'}{2\sqrt{y+1}} = 0$$

at (1,0)

$$4 + y' + \frac{2y'}{2} = 0$$

$2y' = -4 \Rightarrow y' = -2$

E.O.T. :

$y = -2(x-1)$

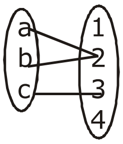
$\boxed{2x + y = 2}$

Q.21 Let A={a,b,c} and B={1,2,3,4}. Then the number of elements in the set $C = \{f : A \to B \mid 2 \in f(A)$ and f is not one–one} is________

Sol. **19**

case - I

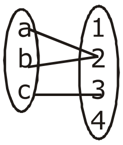
set B only have '2'



= 1

case - II

set B have more element with 2



$= {}^3C_1 \frac{\lfloor 3}{\lfloor 2 \lfloor 1} \cdot \lfloor 2 = 18$

total 18 + 1 = 19

Q.22 The coefficient of x^4 in the expansion of $(1+x+x^2+x^3)^6$ in powers of x, is ______

Sol. **120**

$(1+x)^6(1+x^2)^6$

$6_{c_r} x^r \quad 6_{c_r} x^{2S}$

$6_{c_r} 6_{c_r} \quad x^{r+2S}$

r	s
0	2
4	0
2	1

$\Rightarrow 6_{c_0} 6_{c_2} + 6_{c_4} 6_{c_0} + 6_{c_2} 6_{c_1}$

$\Rightarrow 15+15+15\times6$

$\Rightarrow 120$

Q.23 Let the vectors $\vec{a}, \vec{b}, \vec{c}$ be such that $|\vec{a}| = 2, |\vec{b}| = 4$ and $|\vec{c}| = 4$. If the projection of $\vec{b}$ on $\vec{a}$ is equal to the projection of $\vec{c}$ on $\vec{a}$ and $\vec{b}$ is perpendicular to $\vec{c}$, then the value of $|\vec{a} + \vec{b} - \vec{c}|$ is______

Sol. **6**

$\frac{\vec{b}.\vec{a}}{2} = \frac{\vec{c}.\vec{a}}{2} \quad \boxed{\vec{b}.\vec{a} = \vec{c}.\vec{a}}$

$\boxed{\vec{b}.\vec{c} = 0}$

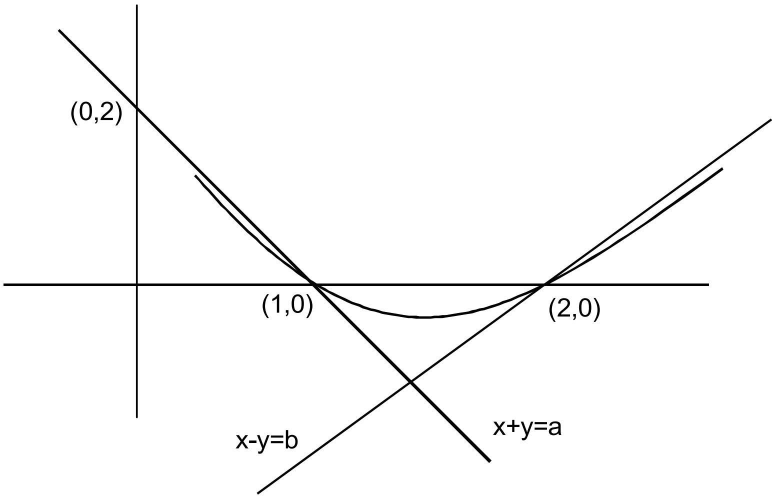
$|\vec{a} + \vec{b} - \vec{c}| = \sqrt{a^2 + b^2 + c^2 + 2\vec{a}.\vec{b} - 2\vec{b}.\vec{c} - 2\vec{a}.\vec{c}}$

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

= 6

Q.24 If the lines x+y=a and x-y=b touch the curve $y=x^2-3x+2$ at the points where the curve intersects the x–axis, then $\frac{a}{b}$ is equal to________

Sol. **0.5**



$y - 0 = -1(x-1)$
$x + y = 1 \Rightarrow a = 1$
$y - 0 = x - 2$
$x - y = 2 = b = 2$

$$\boxed{\frac{a}{b} = \frac{1}{2}}$$

Q.25 In a bombing attack, there is 50% chance that a bomb will hit the target. At least two independent hits are required to destroy the target completely. Then the minimum number of bombs, that must be dropped to ensure that there is at least 99% chance of completely destroying the target, is________

Sol. **11**

Let 'n is total no. of bombs being dropped

at least 2 bombs should hit

$\Rightarrow$ prob ≥ 0.99

$P(x \geq 2) \geq 0.99$

$1 - p(x<2) \geq 0.99$

$1 - (p(x=0) + p(x=1)) \geq 0.99$

$$1-\left[4_{c_0}(p)^0 q^n + {}^nC_1 (P)^1 (q)^{n-1}\right] \geq 0.99$$

$$1-\left[q^n + pnq^{n-1}\right] \geq 0.99$$

$$1-\left[\frac{1}{2^n} + \frac{l}{2} \times \frac{1}{2^{n-1}}\right] \geq 0.99$$

$$1 - \frac{1}{2^n}(n+1) \geq 0.99$$

$$0.01 \geq \frac{1}{2^n}(n+1)$$

$2^n \geq 100 + 100n$

$n \geq 11$

Admission
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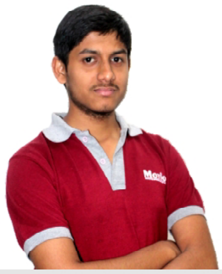
JEE MAIN RESULT 2019

Nitin Gupta
Marks **335** 13th (2019) | Marks **149** 12th (2018)

Shiv Modi
Marks **318** 13th (2019) | Marks **153** 12th (2018)

Ritik Bansal
Marks **308** 13th (2019) | Marks **218** 12th (2018)



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Marks **300** 13th (2019) | Marks **153** 12th (2018)

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1,95,00,000+ viewers | **72,67,900+** viewing hours | **2,11,000+** Subscribers

SERVICES	SILVER	GOLD	PLATINUM
Classroom Lectures (VOD)			
Live interaction	NA		
Doubt Support	NA		
Academic & Technical Support	NA		
Complete access to all content	NA		
Classroom Study Material	NA		
Exercise Sheets	NA		
Recorded Video Solutions	NA		
Online Test Series	NA		
Revision Material	NA		
Upgrade to Regular Classroom program	**Chargeable**	**Chargeable**	**Free**
Physical Classroom	NA	NA	
Computer Based Test	NA	NA	
Student Performance Report	NA	NA	
Workshop & Camp	NA	NA	
Motion Solution Lab- Supervised learning and instant doubt clearance	NA	NA	
Personalised guidance and mentoring	NA	NA	

FEE STRUCTURE

CLASS	SILVER	GOLD	PLATINUM
7th/8th	FREE	₹ 12,000	₹ 35,000
9th/10th	FREE	₹ 15,000	₹ 40,000
11th	FREE	₹ 29,999	₹ 49,999
12th	FREE	₹ 39,999	₹ 54,999
12th Pass	FREE	₹ 39,999	₹ 59,999

+ Student Kit will be provided at extra cost to Platinum Student.

* **SILVER (Trial)** Only valid 7 DAYS or First 10 Hour's Lectures.
** **GOLD (Online)** can be converted to regular classroom (Any MOTION Center) by paying difference amount after lockdown.
*** **PLATINUM (Online + Regular)** can be converted to regular classroom (Any MOTION Center) without any cost after lockdown.

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MOTION™

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