QUICK REVISION TEST
MATRIX

1 Match the following Trignometric ratios with the equations whose one of the roots is given

Column I	Column II
A. $\cos 20^0$	**P.** $x^3 - 3x^2 - 3x + 1 = 0$
B. $\sin 10^0$	**Q.** $32x^5 - 40x^3 + 10x - 1 = 0$
C. $Tan 15^0$	**R.** $8x^3 - 6x - 1 = 0$
D. $\sin 6^0$	**S.** $8x^3 - 6x + 1 = 0$

Answer:
A-R; B-S; C-P; D-Q;

Solution: A) $A = 20^0 \Rightarrow 3A = 60^0 \Rightarrow \cos 3A = \frac{1}{2}$

B) $A = 20^0 \Rightarrow 3A = 60^0 \Rightarrow 8x^3 - 6x - 1 = 0$ where $x = \cos 20^0$

C) $A = 10^0 \Rightarrow \sin 3A = \frac{1}{2} \Rightarrow 8x^3 - 6x + 1 = 0$ where $x = \sin 10^0$

D) $A = 6^0 \Rightarrow \sin 5A = \frac{1}{2} \Rightarrow 32x^5 - 40x^3 + 10x - 1 = 0$ where $x = \sin 6^0$

2. Match the following

Column I	**Column II**
A. The maximum value of $\cos(2A+\theta) + \cos(2B+\theta)$ ($\theta \in R$ and A,B are constants)	**P.** $2\sin(A+B)$
B. Maximum value of $\cos 2A + \cos 2B$ $\left(A, B \in \left(0, \frac{\pi}{2}\right), A + B \, is \, \text{constant}\right)$	**Q.** $2\sec(A+B)$
C. Minimum value of $\sec 2A + \sec 2B$ $\left(A, B \in \left(0, \frac{\pi}{4}\right), A + B \, is \, \text{constant}\right)$	**R.** $2\cos(A+B)$
D. Minimum value of $\sqrt{Tan\theta + \cot\theta - 2\cos(2A+2B)}$ ($\theta \in R$ A,B are constants)	**S.** $2\cos(A-B)$

Answer: A-S; B-R; C-Q; D-P;

Solution:

A) $\cos(2A+\theta)+\cos(2B+\theta)=2\cos(A+B+\theta)\cos(A-B)\le 2\cos(A-B)$

B) $\cos 2A+\cos 2B=2\cos(A+B)\cos(A-B)\le 2\cos(A+B)$

C) $y=\sec x$ always concave up $\quad \therefore \dfrac{\sec 2A+\sec 2B}{2}\ge \sec(A+B)$

D) $\sqrt{Tan\theta+\cot\theta-2\cos(2A+2B)}=\sqrt{(Tan\theta-\sqrt{\cot\theta})^2+4\sin^2(A+B)}\ge 2\sin(A+B)$

3 Match the followig

Column I	**Column II**
A. If $\tan\theta$ is the G.M. between $\sin\theta$ and $\cos\theta$ then $2-4\sin^2\theta+3\sin^4\theta-\sin^6\theta=$	**P.** 1
B. $\sqrt{3}\cot 20^0-4\cos 20^0=$	**Q.** 0
C. $\cot 16^0\cot 44^0+\cot 44^0\cot 76^0-\cot 76^0\cot 16^0=$	**R.** 3
D. $\sum_{r=1}^{9}\sin^2\left(\frac{r\pi}{18}\right)=$	**S.** 5

Answer: A-P; B-P; C-R; D-S;

Solution: (A) $\tan^2\theta=\sin\theta\cos\theta \Rightarrow \sin\theta=\cos^3\theta \;\therefore (1-\sin^2\theta)+(1-3\sin^2\theta)+3\sin^4\theta-\sin^6\theta$

$=\cos^2\theta+(1-\sin^2\theta)^3=\cos^2\theta+\cos^6\theta=\cos^2\theta+\sin^2\theta=1$

(B) $\sin 40^0=\sin(60^0-20^0)$

$2\sin 20^0\cos 20^0=\dfrac{\sqrt{3}}{2}\cos 20^0-\dfrac{1}{2}\sin 20^0$

$4\cos 20^0=\sqrt{3}\cot 20^0-1$

(C) $\dfrac{3+\cot 76^0\cot 16^0}{\cot 76^0+\cot 16^0}=\dfrac{3\sin 76^0\sin 16^0+\cos 76^0\cos 16^0}{\sin(76^0+16^0)}$

$=\dfrac{2\sin 76^0\sin 16^0+\cos(76^0-16^0)}{\sin(76^0+16^0)}$

$=\dfrac{\cos 60^0-\cos 92^0+\cos 60^0}{\sin 92^0}=\dfrac{1-\cos 92^0}{\sin 92^0}=\tan 46^0=\cot 44^0$

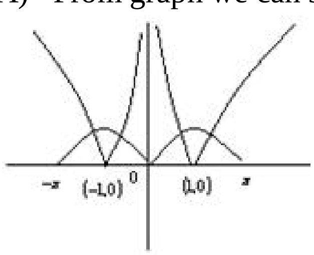
(D) $\sin^2\left(\dfrac{\pi}{18}\right)+\sin^2\left(\dfrac{2\pi}{18}\right)+....+\sin^2\left(\dfrac{\pi}{2}\right)=5$

4 Match column I with column II

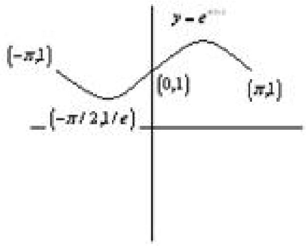
Column I	**Column II**
A. Number of solutions of $\|\log\|x\|\| = \|\sin x\|$ in $[-\pi, \pi]$ is	**P.** 0
B. Number of solutions of $e^{\sin x} = \frac{1}{3}$ in $[-\pi, \pi]$ is	**Q.** 1
C. Number of solutions of $\tan x = \tan^{-1} x$ in $(0, 2\pi)$ is	**R.** 2
D. Number of solutions of $\sin^4 x = 1 + \tan^4 x$ is	**S.** 3
	T. 4

Answer: A-T; B-P; C-Q; D-P;

Solution: (A) From graph we can see no. of solution is 4



(B) $x = \frac{-\pi}{2} \Rightarrow e^{-\sin x} = \frac{1}{e} \Rightarrow x = \frac{\pi}{2} \Rightarrow e^{\sin x} = e$



$\frac{1}{e} > \frac{1}{3}$ So, y = $e^{\sin x}$ can not intersect y = $\frac{1}{3}$

(C) $\tan x = \tan^{-1} x$ has solution in $\left(\pi, \frac{3\pi}{2}\right)$

This can be seen from the graph.

(D) $\sin^4 x \le 1,\ \ 1 + \tan^4 x \ge 1$

RHS = 1 for x = 0 where LHS = 1 for $x = \pm\frac{\pi}{2}$

So, there is no solution.

5 Let $a = \left(\sin^{-1} x\right)^{\sin^{-1} x}$; $b = \left(\sin^{-1} x\right)^{\cos^{-1} x}$; $c = \left(\cos^{-1} x\right)^{\sin^{-1} x}$; $d = \left(\cos^{-1} x\right)^{\cos^{-1} x}$ then match the column I with column II

Column I	Column II
A. $x \in (0, \cos 1)$	**P.** a > b > d > c
B. $x \in \left(\cos 1, \frac{1}{\sqrt{2}}\right)$	**Q.** d > c > a > b
C. $x \in \left(\frac{1}{\sqrt{2}}, \sin 1\right)$	**R.** b > a > d > c
D. $x \in (\sin 1, 1)$	**S.** a < b < d < c
	T. c > d > a > b

Answer: A-Q; B-T; C-R; D-P;

Solution: (A) $x \in (0, \cos 1) \Rightarrow \cos^{-1} x > \sin^{-1} x$

Also $\cos^{-1} x > 1$ & $\sin^{-1} x < 1$

$\therefore \left(\cos^{-1} x\right)^{\cos^{-1} x}$ is greatest & $\left(\sin^{-1} x\right)^{\cos^{-1} x}$ is leastAnd $\left(\sin^{-1} x\right)^{\sin^{-1} x} < \left(\cos^{-1} x\right)^{\sin^{-1} x}$

$\therefore d > c > a > b$

(B) $x \in \left(\cos 1, \frac{1}{\sqrt{2}}\right) \Rightarrow \cos 1 < x < \frac{1}{\sqrt{2}} \Rightarrow \cos^{-1} x > \sin^{-1} x$ & $\cos^{-1} x < 1, \ \sin^{-1} x < 1$

So, $\left(\cos^{-1} x\right)^{\sin^{-1} x}$ is greatest & $\left(\sin^{-1} x\right)^{\cos^{-1} x}$ is least

Also $\left(\cos^{-1} x\right)^{\cos^{-1} x} > \left(\sin^{-1} x\right)^{\sin^{-1} x} \therefore c > d > a > b$

(C) For $\frac{1}{\sqrt{2}} < x < \sin 1$

We have $1 > \sin^{-1}x > \cos^{-1}x$

so, $(\sin^{-1} x)^{\cos^{-1} x}$ is greatest & $(\cos^{-1} x)^{\sin^{-1} x}$ is least

And $\left(\sin^{-1} x\right)^{\sin^{-1} x} > \left(\cos^{-1} x\right)^{\cos^{-1} x}$

Hence b > a > d > c

(D) $\sin 1 < x < 1$

$\Rightarrow \sin^{-1} x > 1 > \cos^{-1} x$

$\Rightarrow$ a is greatest & c is the least and between b, d greater is b.

$\therefore$ a > b > d > c.S

6 Volume of parallelopiped formed by vectors $\vec{a} \times \vec{b}, \vec{b} \times \vec{c}$ and $\vec{c} \times \vec{a}$ is 36 sq.units.

Column I	**Column II**
A. Volume of parallelopiped formed by vectors $\vec{a}, \vec{b}$ and $\vec{c}$ is	**P.** 0 sq. units
B. Volume of tetrahedron formed by vectors $\vec{a}, \vec{b}$ and $\vec{c}$	**Q.** 12 sq. units
C. Volume of parallelopiped formed by vectors $\vec{a} + \vec{b}, \vec{b} + \vec{c}$ and $\vec{c} + \vec{a}$	**R.** 6 sq.units
D. Volume of parallelopiped formed by vectors $\vec{a} - \vec{b}, \vec{b} - \vec{c}$ and $\vec{c} - \vec{a}$	**S.** 1 sq.units

Answer: A-R; B-S; C-Q; D-P;

Solution: $[\bar{a}\,\bar{b}\,\bar{c}] = \pm 6$

a) $V = \left|\left[\bar{a}\,\bar{b}\,\bar{c}\right]\right| = 6$

b) $V = \frac{1}{6}\left|\left[\bar{a}\,\bar{b}\,\bar{c}\right]\right| = 1$

c) $V = \left|2\left[\bar{a}\,\bar{b}\,\bar{c}\right]\right| = 12$

d) V = 0

7 Match the following

Column I	**Column II**
A. The coordinates of a point on the line $x = 4y + 5, z = 3y - 6$ at a distance 3 from the point $(5,3,-6)$ is	**P.** $(-1,-2,0)$
B. The plane containing the lines $\frac{x-2}{3} = \frac{y+3}{5} = \frac{z+5}{7}$ and $\frac{x-4}{1} = \frac{y-2}{4} = \frac{z-3}{7}$ passes through	**Q.** $(5,0,-6)$
C. A line passes through two points $A(2,-3,-1)$ and $B(8,-1,2)$. The coordinates of a point on this line farthest to the origin at a distance of 14 units from A is	**R.** $(2,5,7)$
D. The coordinates of the foot of the perpendicular from the point $(3,-1,11)$ on the line $\frac{x}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ is	**S.** $(14,1,5)$

Answer: A-Q; B-P; C-S; D-R;

Solution: (a) $\frac{x-5}{4} = y = \frac{z+6}{3}$

(5, 0, -6) lie on the line and 3 units from (5, 3, -6)

Let $P = (4t+5, t, 3t-6)$

$A = (5,3,-6)$

$PA = 3 \Rightarrow t = 0$

$\therefore P = (5,0,-6) \Rightarrow a \to q$

(b) Plane equation

$$\begin{vmatrix} x-2 & y+3 & z+5 \\ 3 & 5 & 7 \\ 1 & 4 & 7 \end{vmatrix} = 0$$

$(x-2)(7) - (y+3)14 + (z+5)7 = 0$

$x - 2 - 2y - 6 + z + 5 = 0$

$x - 2y + z - 3 = 0$

$\Rightarrow b \to p$

(c)Equation of the line is

$$\frac{x-2}{6}=\frac{y+3}{2}=\frac{z+1}{3}=t$$

Let $P=(6t+2,2t-3,3t-1)$

PA = 14 $\Rightarrow \sqrt{36t^2+4t^2+9t^2}=14$

$\Rightarrow 7t=\pm 14 \Rightarrow t=\pm 2$

$\therefore P=(14,1,5)$ or $(-10,-7,-7)$

(d) $A=(3,-1,11)$ foot $F(2t,3t+2,4t+3)$

$AF \perp L \Rightarrow t=1$

$\therefore F(2,5,7)$

$d \to r$

8 Match the following

Column I	**Column II**
A. In a triangle ABC, if $\cos A+\cos B+\cos C=\frac{9}{5}$ Then $\frac{R}{r}$ is	P. $\frac{6}{5}$
B. In a triangle ABC, if $r_1=2r_2=3r_3$ then $a:b$ is	Q. $\frac{4}{5}$
C. If $b=3, c=2, A=120^0$ then length of bisector of angle A is	R. $\frac{5}{4}$
D. The ratio of circum radii of a triangle to its pedal triangle is	**S.** a root of $4x^2-13x+10=0$

Answer: A-R,S; B-R,S; C-P; D-S;

Solution: A. $1+\frac{r}{R}=\frac{9}{5} \Rightarrow \frac{r}{R}=\frac{4}{5} \Rightarrow \frac{R}{r}=\frac{5}{4}$

B. $\frac{s-a}{1}=\frac{s-b}{2}=\frac{s-c}{3} \Rightarrow a:b=5:4$

C. $\frac{2bc}{b+c}\cos\frac{A}{2}=\frac{2.3.2}{3+2}.\cos 60^0=\frac{6}{5}$

D. $2:1$

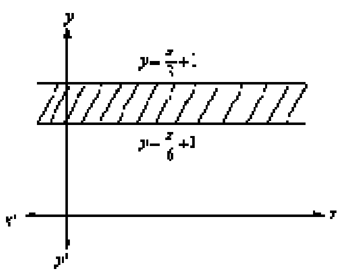
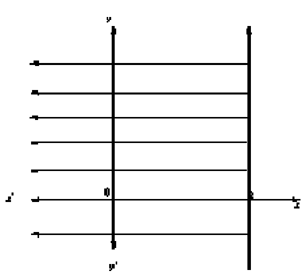
9 Match the following

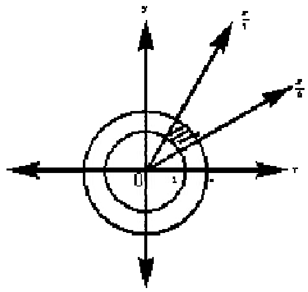
Column I	Column II
A. Locus of point z satisfying $\text{Re}(z^2) = \text{Re}(z + \overline{z})$	**P.** Ellipse
B. Locus of z satisfying $\|z - z_1\| + \|z - z_2\| = \lambda, \lambda \in R^+$ and $\lambda > \|z_1 - z_2\|$	**Q.** Hyperbola with eccentricity $\sqrt{2}$
C. Locus of z satisfying $\left\|\frac{z - z_1}{z - z_2}\right\| = k(k \neq 1, > 0)$	**R.** A square
D. Locus of Z satisfying $\|z + \overline{z}\| + \|z - \overline{z}\| = 2$	**S.** A circle

Answer: A-Q; B-P; C-S; D-R;

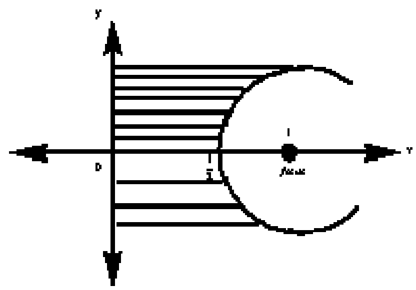
Solution: Conceptual

10 Match the column – I (in which arg and diagram is given) with column – II (in which corresponding locus is given)

Column I	Column II
A. 	**P.** $\frac{\pi}{6} < \arg Z < \frac{\pi}{3}$, $2 < \|z\| < 4$
B. 	**Q.** $z + \overline{z} < 4$

C. 

R. $\frac{\pi}{6} < Im(z-i) < \frac{\pi}{3}$

D. 

S. $\left|\arg \bar{z} + \frac{\pi}{4}\right| < \frac{\pi}{12}, 4 < z\bar{z} < 16$

T. $\text{Re}(z) <| z-1|$

Answer:
A-R; B-Q; C-PS; D-T;

Solution: Let Z = x+iy

A) Given $\frac{\pi}{6}+1 < y < \frac{\pi}{3}+1 \Rightarrow \frac{\pi}{6} < y-1 < \frac{\pi}{3} \Rightarrow \frac{\pi}{6} < I_m(Z-i) < \frac{\pi}{3}$

B) Given y < 2 $\Rightarrow 2y < 4 \Rightarrow z+\bar{z} < 4$

C) $\frac{\pi}{6} < \arg(z) < \frac{\pi}{3}$ and 2<|z|<4

$\Rightarrow -\frac{\pi}{3} < -\arg z < -\frac{\pi}{6}$ and 4 < $|z|^2$ < |6$\Rightarrow \frac{\pi}{4} - \frac{\pi}{3} < \frac{\pi}{4} + \arg \bar{z} < \frac{\pi}{4} - \frac{\pi}{6}$ and 4 < z $\bar{z} < 16$

$\Rightarrow | \arg \bar{z} + \frac{\pi}{4} |< \frac{\pi}{12}$ and $4 < z \;\; \bar{z} < 16$

D) Equation of parabola is $y^2 = 4\left(\frac{1}{2}\right)\left(x-\frac{1}{2}\right) \Rightarrow y^2 = 2x-1$

$z = (x, y)$ lies out sides of y^2 = 2x-1$\Rightarrow y^2 > 2x-1 \Rightarrow y^2 - 2x + 1 > 0 \Rightarrow x^2 - 2x + 1 + y^2 > x^2$

$\sqrt{(x-1)^2 + y^2} > (n) \Rightarrow | z-1 |> \text{Re}(z)$

11 Given $f(x+y) = f(x), f(y) \forall x, y \in R$ and $f(1) = 2$. If in ΔABC, $a = f(3), b = f(1) + f(3), c = f(2) + f(3)$. Also r and R are the inradius and cricumradius of ΔABC. Now match the following

Column I	Column II
A. $\frac{R}{r} \geq$	**P.** $\frac{16}{9}$

B. $\tan^2 A \geq$ **Q.** $\frac{7}{9}$

C. $\sec^2 A \leq$ **R.** $\frac{16}{7}$

D. $r \leq$ **S.** $\sqrt{7}$

Answer:
A-P,Q,R; B-Q; C-P,R,S; D-S;

Solution: $f(2) = f(1) \times f(1) = 4,\ f(3) = f(1) \times f(2) = 8$

$\therefore a = 8, b = 10, c = 12 \Rightarrow \Delta = 15\sqrt{7}$ and $R = \frac{16}{\sqrt{7}} \Rightarrow r = \frac{\Delta}{S} = \sqrt{7}$

$\cos A = \frac{3}{4} \Rightarrow \sec^2 A = \frac{16}{9}$ and $\tan^2 A = \frac{7}{9}$.

12 Match following Column – I with Column –II

Column I	Column II
A. Locus of the point $'z'$ satisfying the equation $\text{Re}(z^2) = \text{Re}(z + \bar{z})$ is	**P.** a straight line
B. Locus of the point 'z' satisfying the equation $\lvert z - z_1 \rvert + \lvert z - z_2 \rvert = \lambda, \lambda \in R^+$ and z_1, z_2 are two fixed complex numbers such that $\lambda > \lvert z_1 - z_2 \rvert$ is	**Q.** a circle
C. Locus of the point 'z' satisfying the equation $\left\lvert \frac{2z - i}{z + 1} \right\rvert = m,$ where $i = \sqrt{-1}, m \in R^+$ is	**R.** an ellipse
D. If $\lvert \bar{z} \rvert = 25$ then the locus of the points represented by $-1 + 75\bar{z}$ is	**S.** a hyperbola

Answer: A-S; B-R; C-P,Q; D-Q;

Solution: a) Let $z = x + iy \Rightarrow x^2 - y^2 = 2x \Rightarrow z$ lies on a hyperbola

b) $\lvert z - z_1 \rvert + \lvert z - z_2 \rvert = \lambda$ and $\lambda > \lvert z_1 - z_2 \rvert \Rightarrow z$ lies on an ellipse

c) $\frac{\lvert z - i/2 \rvert}{\lvert z + 1 \rvert} = \frac{m}{2}$, if m = 2 $\Rightarrow$ z lies on a straight line if $m \neq 2 \Rightarrow z$ lies on a circle

d) $\lvert z \rvert = 25,$ let $-1 + 75\bar{z} = \omega \Rightarrow \lvert \omega + 1 \rvert = 75 \lvert \bar{z} \rvert = 75 \times 25 \Rightarrow \omega$ lies on a circle

13 Match the following Column-I, Column-II

Column I	Column II
A. If the line $3x + ay - 20 = 0$ cuts the circle $x^2 + y^2 = 25$ at real, distinct or coincident points and $\lvert a \rvert \in [k, \infty)$ then [k] is [.] denotes G.I.F	**P.** 1
B. If the point (2, k) lies out side the circles $x^2 + y^2 + x - 2y - 14 = 0$ and $x^2 + y^2 = 13$ then least positive integral value of k is	**Q.** 2

C. No. of common tangents to the circles $x^2+y^2=4$ and $x^2+y^2-6x-8y+24=0$ is — **R.** 3

D. The lines given by $x^2-3xy-3x+9y=0$ are normals of a circle which touches the circle $x^2+y^2-6x+6y+17=0$ externally then radius is — **S.** 4

T. 5

Answer: A-Q; B-T; C-S; D-R;

Solution: A) $r \ge d \Rightarrow 5 \ge \frac{|20|}{\sqrt{9+a^2}} \Rightarrow \sqrt{9+a^2} \ge 4$

$a^2 \ge 7 \Rightarrow |a| \in [\sqrt{7}, \infty] \Rightarrow [K]=2$

B) $S_{11} > 0$

$4+k^2+2-2k-14>0 \Rightarrow k^2-2k-8>0 \Rightarrow (k-4)(K+2)>0$

$k \in (-\infty,2)v(4,\infty) \Rightarrow S_{11}>0 \Rightarrow 4+K^2>13 \Rightarrow k^2>9$

$K \in (-\infty,-3)V(4,\infty) \Rightarrow \therefore K \in (-\infty,-3)V(4,\infty) \Rightarrow \therefore K=5$

C) $C_1=(0,0) r_1=2 \Rightarrow C_2=(3,4) r_2=1 \Rightarrow C_1C_2=5$

$C_1C_2 > r_2+r_1$

Circles are touches internally

No. common tangets = 4

D) $x(x-3y)-3(x-3y)=0$

Consider a circle with center (-1, 8), radius 2 units

Consider another circle with center (2, 4) radius 3 units

No.of ammon tangents = 3

$(x-3)(x-3y)=0$

$\left.\begin{array}{l} x=3 \\ y=\frac{1}{3}x \end{array}\right\}$ centre of circle

$C_1=(3,1)\ \ r_1=r \Rightarrow C_2=(3,-3)\ \ r_2=1$

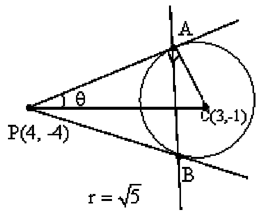
$C_1C_2=r_1+r_2 \Rightarrow 4=r+1 \Rightarrow r=3$

14 From the point P(4, -4) tangents PA and PB are drawn to the circle $x^2+y^2-6x+2y+5=0$ (C is centre of the circle)

Column I	**Column II**
A. Length of AB	**P.** 5/2
B. Tangents of angle between PA and PC	**Q.** $\sqrt{10}$
C. Area of triangle PAB	**R.** 1
D. Absolute difference of slope of PA and PB	**S.** $3/4$

Answer: A-Q; B-R; C-P; D-P;

Solution:



A – Q; B – R; C – P; D - P

Chord of contact of P is $S_1 = 0$, $x - 3y - 11 = 0$

Length of AB = $2\sqrt{r^2 - d^2} = \sqrt{10}$

$\sin\theta = \frac{AC}{PC} = \frac{\sqrt{5}}{\sqrt{10}} = \frac{1}{\sqrt{2}} \Rightarrow \tan\theta = 1$

Area of Δle PAB= $\frac{1}{2} \times \sqrt{10} \times \frac{5}{\sqrt{10}} = \frac{5}{2}$

Let slope be m

Tangent line be mx – y = 4m + 4 , r = d

$\sqrt{5} = \frac{|3m + 1 - 4m - 4|}{\sqrt{1 + m^2}} \Rightarrow 2m^2 - 3m - 2 = 0$ $m = \frac{-1}{2}, 2 \Rightarrow |m_1 - m_2| = \frac{5}{2}$

15 Match the following

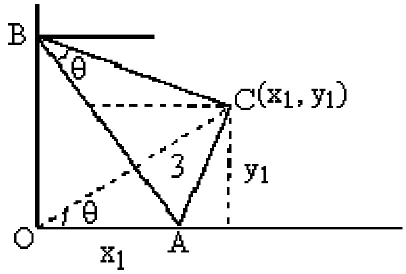
Column I	**Column II**
A. A ray of light is traveled along the line 2x – y + 1 = 0 meets the line x + y = 0 and then reflects. The equation of the reflected ray is	**P.** 3x – 4y=0
B. A(1, 2),B(-1, 5) are two vertices of ΔABC. The third vertex C lies on 2x + y = 2.The locus of centroid of ΔABC is	**Q.** 3x +4y=0
C. Equation of the line making an angle 45^0 with 3x – y + 7 = 0 and passing through (1, 1) is	**R.** x – 2y +1 = 0
D. A right angled triangle ABC where $\angle C = \frac{\pi}{2}$ with $AB : BC : CA = 5 : 4 : 3$ moves such that A and B are always on X & Y axes. The locus of C is	**S.** 2x + y = 3

Answer: A-R; B-S; C-RS; D-PQ;

Solution: A) $\frac{x + y}{2} = \frac{2x - y + 1}{2}$ i.e. x – 2y + 1 = 0

B) $(3x_1, 3y_1, -7)$ lies on 2x + y = 2 $\Rightarrow 6x + 3y = 9 \Rightarrow 2x + y = 3$

C) $m_1 = 3$, $m_2 = \frac{3 - 1}{1 + 3} = \frac{1}{2}$ or -2. the lines are x – 2y + 1 = 0 & 2x + y = 3



D)

$\angle AOB = \angle ACB = 90^0 \Rightarrow OACB$ is cyclic

If $\angle AOC = \theta$, then $\angle ABC = \theta$ (angle in the same segment)

$\Rightarrow \tan\theta = \frac{3}{4} = \frac{|y_1|}{|x_1|}$

Locus is 3x – 4y = 0 or 3x + 4y = 0

16 Match the following

Column I	**Column II**
A. The family of lines $x(2a+3b)+y(3a+2b)=2(b-a)$ passes through the point for all values of a and b then the point is	**P.** $(3,-2)$
B. If $9a^2+4b^2-c^2+12ab=0$, then the family of lines $ax+by+c=0$ are concurent at	**Q.** $(3\ 2)$
C. If$12a^2-6b^2-c^2+ab+5bc+ac=0$ then the family of lines $ax+by+c=0$ is concurent at	**R**. $(-4,-3)$
D. If $3a+2b-c=0$ then the family of lines $ax+by+c=0$ is concurent at	**S**. $(+2,-2)$
	T. $(-3,-2)$

Answer: A-S; B-Q,T; C-P,R; D-T;

Solution: A) $a(2x+3y+2)+b(3x+2y-2)=0$ Solve:(2, -2)

B) $9a^2+4b^2-c^2+12ab=0=D(3a+2b)^2-c^2=0 \qquad c=\pm(3a+2b)$

$$\left.\begin{aligned}3a+2b+c=0\\3a+2b-c=0\end{aligned}\right\}=D(3,2),(-3,2)$$

C) $12a^2+(b+c)a-(6b^2+c^2-5bc)=0$

$$a=-\frac{(b+c)\pm\sqrt{(b+c)^2+48(6b^2+c^2-5bc)}}{24}\Rightarrow 3a-2b+c=0,\ 4a+3b-c=0$$

D) $3a+2b-c\Rightarrow \begin{matrix} ax+by+c=0\Rightarrow ax+by+3a+2b=0 \\ x=-3, y=-2 \qquad a(x+3)+b(y+2)=0\end{matrix}$

17 Given two vectors $\overline{a} = -\overline{i} + 2\overline{J} + 2\overline{k}$, $\overline{b} = -2\overline{i} + \overline{J} + 2\overline{k}$

Column I	**Column II**
A. A vector coplanar with $\overline{a}$ *and* $\overline{b}$	**P.** $-3\overline{i} + 3\overline{J} + \overline{k}$
B. A vector which is perpendicular to both and $\overline{a}$ *and* $\overline{b}$	**Q**. $2\overline{i} - 2\overline{J} + 3\overline{k}$
C. A vector which is equally inclined to $\overline{a}$ *and* $\overline{b}$	**R.** $\overline{i} + \overline{J}$
D. A vector which forms a Triangle with $\overline{a}$ *and* $\overline{b}$	**S.** $\overline{i} - \overline{J} + 5\overline{k}$

Answer: A-R; B-Q; C-P,Q,S; D-R;

Solution: A) Vector $\overline{i} + \overline{J}$ is coplanar with $\overline{a}$ *and* $\overline{b}$

B) $\overline{a} \times \overline{b} = 2\overline{i} - 2\overline{J} + 3\overline{k}$

C) $\overline{c}$ is equally inclined to $\overline{a}$ *and* $\overline{b}$ *then* $\overline{a}.\overline{c} = \overline{b}.\overline{c}$ *for* $\overline{c} = \overline{i} - \overline{J} + 5\overline{k}$

D) Vector is forms Δle with $\overline{a}.\overline{b} \Rightarrow \overline{c} = \overline{a} + \overline{b} = -3\overline{i} + 3\overline{J} + 4\overline{k}$

18 The Parabola $y^2 = 4ax$ has a chord AB joining points A$\left(at^2{}_1, 2at_1\right)$ and B $\left(at^2{}_2, 2at_2\right)$

Column I	**Column II**
A. If normal chord AB subtends 90^0 at origin then	**P**. $t_2 = -t_1 + 2$
B. If AB is a focal chord then	**Q.** $t_2 = \frac{-4}{t_1}$
C. If AB subtends 90^0 at point (0 , 0) then	**R.** $t_2 = \frac{-1}{t_1}$
D. If AB is inclined at 45^0 to the axis of parabola then	**S**. $t^2{}_1 = 2$

Answer: A-S; B-R; C-Q; D-P;

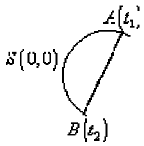
Solution: Slop of the normal at t is –t . Slop of the chord joining t_1 and t_2 is $\frac{2}{t_1 + t_2}$

A) $t_2 = -t_1 - \frac{2}{t_1}, and \frac{2}{t_1}.\frac{2}{t_2} = -1 \Rightarrow t^2{}_1 = 2$

B) $t_1 t_2 = -1$

C) $\frac{2}{t_1}.\frac{2}{t_2} = -1 \Rightarrow t_1 t_2 = -4$

D) $\frac{2}{t_1 + t_2} = \tan 45^0 \Rightarrow t_1 + t_2 = 2$



19 The vertices of a triangle are $A(-10,8), B(14,8) \& C(-10,26)$. Let G,I,O,S be the centriod, incentre, orthocenter, circumcentre respectively of ΔABC

Column I	**Column II**
A. The inradius r is	**P.** 15
B. The circumradius R is	**Q.** 12
C. The area of ΔIGO is	**R.** 6
D. The area of ΔSGI is	**S.** 3

Answer: A-R; B-P; C-R; D-S;

Solution: (A) $\Delta ABC = 216, S = \frac{18+24+30}{2} = 36$, $r = \frac{\Delta}{5} = \frac{216}{36} = 6$

(B) $R = \frac{30}{2} = 15$

(C) $I = (-4,14), G = (-2,14), O = A$

$$\Delta IGO = \frac{1}{2}\begin{vmatrix} -4 & 14 & 1 \\ -10 & 8 & 1 \\ -2 & 14 & 1 \end{vmatrix} = 6$$

(D) S = (2,17), $\Delta SGI = 3$

20 Match the following

Column I	**Column II**
A. If one of the diameters of the circle $x^2 + y^2 - 2x - 6y + 6 = 0$ is a chord to the circle centre at (2,1) and radius r then the solution of the equation $[x] \le r - 1$	**P.** $2/3$
B. If the straight line $y = mx$ touches or lies outside the Circle $x^2 + y^2 - 20y + 90 = 0$. Then the solution of $[x] = \lvert m \rvert$ is	**Q.** 2
C. $\overline{AB}$ is a chord of the circle $x^2 + y^2 = 25$ and the tangents at A and B intersect at $'C'$ .If $(2, 2\sqrt{3})$ be the midpoint of $\overline{AB}$ And $'l'$ is the area of the quadrilateral $OACB$. Then the Solution of the equations $[x] = \left[\frac{l}{8}\right]$ is	**R.** $-1/2$
D. A circle $'C'$ of radius unity touches both the co-ordinate axes lies in first quadrant. If another circle $'C_1'$ also touches both axes in first quadrant and cuts $'C'$ orthogonally and if $'r'$ is radius of $'C_1'$ then the solution of the equation $[x] = [r]$ is	**S.** 16/5
	T. 0

Answer: A-PQRT; B-PQST; C-Q; D-PST;

Solution: $A \to r = 3$

$[x] \le 2 \to x \in (-\infty, 3)$

$B \to |m| \le 3, [x] = 0,1,2,3$

$C \to l = \frac{75}{4} \to [x] = 2$

$D \to r = 2 \pm \sqrt{3}$

21 Match the following

Column I	Column II
A. If $\sqrt{3}bx + ay = 2ab$ Touches the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ at a part whose Eccentric angle is θ then $\operatorname{cosec}\theta$	**P.** 0
B. If e_K is the eccentricity of $(x-3)(y+2) = k^2$ then $e_2 - e_3 =$	**Q.** 1
C. If $x^2 + y^2 = a^2$ is drawn without intersecting the Curve xy=9 then integral values of $'a'$ are	**R.** 2
D. If $xy = 1 + \sin^2\theta$ is a family f rectangular hyperbolas And $'K'$ is the area of the triangle formed by any tangent With co-ordinate axes then K can be equal to	**S.** 3
	T. 4

Answer: A-R; B-P; C-PQRST; D-RST;

Solution: $A \to \theta = \frac{\pi}{6}$

$B \to$ *for any k it is* rectangular hyperbola

$C \to a = 0,1,2,3,4$

$D \to$ compare with $xy = c^2$

Tangent at (x_1, y_1) is $\frac{x}{x_1} + \frac{y}{y_1} = 2 \Rightarrow K = 2c^2 = 2(1 + \sin^2\theta)$

22 A function is defined as $f : \{x_1, x_2, x_3, x_4, x_5, x_6\} \to \{y_1, y_2, y_3\}$

Column I	Column II
A. Number of onto functions	**P.** is divisible by 9
B. Number of functions in which $f(x_i) \ne y_i$	**Q.** is divisible by 5
C. Number of invertible functions	**R.** is divisible by 4
D. Number of many one functions	**S.** is divisible by 3

T. is a prime

Answer: A-P,Q,R,S; B-P,R,S; C-P,Q,R,S; D-P,S;

Solution: A) $3^6 - {}^3C_1 2^6 + {}^3C_2 1^6 = 540$

B) x_1, x_2, x_3 can be assigned in 2^3 ways and x_4, x_5, x_6 can be in 3^3 ways

$\therefore$ Total no of ways = $2^3 \times 3 = 216$

C) Number of invertible functions is zero, since it is not possible to have one-one functions.

D) All functions are many one functions = 729

23 Match the following Column-I with Column-II

Column I	Column II
A. The number of cubes with the six faces numbered1to 6 can be made, if the sum of the number in each pair of opposite faces is 7 equals	**P.** 2
B. A man is expected to vote for atleast one of three positions mayor, secretary, attorney. The number of ways be can vote if there are 3 candidates each for three positions is 9k where k is	**Q.** 3
C. The number of ways in which 4 married couple can be seated at a round table if no husband and wife as well as no two men are to seat together is 3k where k is	**R.** 4
D. The sum of all numbers of the form $\frac{\angle 12}{\angle a \angle b \angle c}$ where $a, b, c \in W$ satisfy $a + b + c = 12$, is 3^{3k} where k is	**S.** 7
	T. 1

Answer: A-P; B-S; C-R; D-R;

Solution: A) 1,2,3 have same vertex; 1,2,4 have the same vertex 2 cases are possible

B) ${}^3C_1.{}^3C_1 + {}^3C_2.{}^3C_1 + {}^3C_3.{}^3C_1.{}^3C_1.{}^3C_1 = 9 + 27 + 27 = 63 \ \therefore k = 7$

C) First ladies be seated in $\angle 3$ ways

Then men can be placed in two ways

D) $(1 + x + y)^{12} = \sum \frac{\angle 12}{\angle a \angle b \angle c} x^b y^c$ where a + b + c = 12$\therefore$ $\frac{\angle 12}{\angle a \angle b \angle c} = 3^{12}$ $\quad \therefore \ k = 4$

24 Match the following Column-I with Column-II

Column I	Column II
A. Number of straight lines joining any two of 10 points of which four points are collinear	**P.** 30

B. Maximum number of points of intersection of 10 straight lines in the plane **Q**. 60

C. Maximum number of points of intersection of six circles in the plane **R.** 40

D. Maximum number of points of intersection of six parabolas **S.** 45

Answer: A-R; B-S; C-P; D-Q;

Solution: A) $^{10}C_2 - ^4C_2 + 1 = 45 - 6 + 1 = 40$

B) $1 \times {}^{10}C_2 = 45$

C) $2 \times {}^6C_2 = 30$

D) $^6C_2 \times 4 = 60$

25 Match the following Column-I with Column-II

Column I	Column II
A. If $\|A\| = 2$, then $\|2A^{-1}\| =$ (where A is of order 3)	**P.** 1
B. If $\|A\| = \frac{1}{8}$ then $\|adj(adj\, 2A)\| =$ (where A is of order 3)	**Q.** 4
C. If $(A+B)^2 = A^2 + B^2$, and $\|A\| = 2$, then $\|B\| =$ (where A and B are of odd order)	**R.** 24
D. $\|A_{2\times2}\| = 2$, $\|B_{3\times3}\| = 3$ and $\|C_{4\times4}\| = 4$, then $\|ABC\|$ is equal to	**S.** 0
	T. None

Answer: A-Q; B-P; C-S; D-T;

Solution: A) $|A| = 2 \Rightarrow |2A^{-1}| = \frac{2^3}{|A|} = 4$

B) $\left|adj\left(adj\left(2A\right)\right)\right| = |2A|^4 = 2^{12}\,|A|^4 = \frac{2^{12}}{2^{12}} = 1$

C) $(A+B)^2 = A^2 + B^2 \Rightarrow AB + BA = 0 \Rightarrow |AB| = |-BA| = -|BA| = -|AB| \Rightarrow |AB| = 0$
$\Rightarrow |B| = 0$

D) Product ABC is not defined

26 A is a set containing n elements. A subset P of A is chosen at random. The set A is reconstructing by replacing the elements of P. A subset Q of A is chosen at random. The probability that

Column I	Column II
A. $P \cap Q = \phi$	**P.** $\frac{n \cdot 3^{n-1}}{4^n}$
B. $n(P \cap Q) = 1$	**Q.** $\left(\frac{3}{4}\right)^n$
C. $P \cup Q = A$	**R.** ${}^{2n}C_n \mid 4^n$
D. n(P) = n(Q)	**S.** $\frac{9}{2}\frac{n(n-1)}{4^n}$

Answer: A-Q; B-P; C-Q; D-R;

Solution:

A) $n(S) = 4^n$, $P \cap Q \Rightarrow n(E) = {}^nC_0 2^n + {}^nC_1 2^{n-1} .... + {}^nC_n$

$\Rightarrow P(E) = \left(\frac{3}{4}\right)^n \quad = (2+1)^n = 3^n$

B) $n(P \cap Q) = 1 \Rightarrow n(E) = {}^nC_1 \cdot (2+1)^{n-1} = n \cdot 3^{n-1} \;\Rightarrow P(E) = \frac{n \cdot 3^{n-1}}{4^n}$

C) $P \cup Q = A \Rightarrow n(E) = {}^nC_0 \cdot 1^0 + {}^nC_1 \cdot 2^1 + {}^nC_2 \cdot 2^2 + ... + {}^nC_n \cdot 2^n$

$P(E) = \left(\frac{3}{4}\right)^n = (1+2)^n = 3^n$

D) $n(P) = n(Q) \Rightarrow ({}^nC_0)^2 + ({}^nC_1)^2 + ... + ({}^nC_n)^2 = {}^{2n}C_n$

$P(E) = {}^{2n}C_n \mid 4^n$

27

Let $f(x) = \begin{cases} a\left(x^2 - x\right) + b & if \quad x < 1 \\ x - 1 & if \quad 1 \le x \le 3 \\ cx^2 - dx + 2 & if \quad x > 3 \end{cases}$ be a differentiable function $\forall\ x \in R$ then

Column I	Column II
A. a =	**P.** 0
B. b =	**Q.** $\frac{1}{3}$

C. c =

D. d =

R. $\frac{1}{2}$

S. 1

Answer: A-S; B-P; C-Q; D-S;

Solution:

F is diff. $\Rightarrow$ f is cont. $\Rightarrow$ f(1) = b = 0

$[a(2x-1)] = 1 \Rightarrow a = 1$

$2 = f(3) = 9c - 3d + 2 \Rightarrow 3d = 9c \Rightarrow d = 3c$

$1 = [2cx - d] \Rightarrow 6c - d = 1$

$x = 3 \Rightarrow 3c = 1 \Rightarrow c = \frac{1}{3} \Rightarrow d = 1$

28 Column 1 gives functions and column 2 gives the nature of the functions

Column I

A. $f:[0,\infty) \to [0,\infty),\ f(x) = \frac{x}{1+x}$

B. $f: R \to \{0\} \to R,\ f(x) = x - \frac{1}{x}$

C. $f: R \to \{0\} \to R,\ f(x) = x + \frac{1}{x}$

D. $f: R \to R,\ f(x) = 2x + \sin x$

Column II

P. one - one onto

Q. one - one but not onto

R. onto but not one – one

S. neither one – one nor onto

Answer: A-Q; B-R; C-S; D-P;

Solution: Match the items of Column I with those of Column II.

Column I	**Column II**
a) $f:[0,\alpha)\to[0,\alpha),\ f(x)=\dfrac{x}{1+x}$	p) one - one onto
b) $f:R\to\{0\}\to R,\ f(x)=x-\dfrac{1}{x}$	q) one - one but not onto
c) $f:R\to\{0\}\to R,\ f(x)=x+\dfrac{1}{x}$	r) onto but not one - one
d) $f:R\to R,\ f(x)=2x+\sin x$	s) neither one – one nor onto

29 A function is defined as $f:\{a_1,a_2,a_3,a_4,a_5,a_6\}\to\{b_1,b_2,b_3\}$

Column I	Column II
A. Number of surjective functions	**P.** divisible by 9
B. Number of functions in which $f(a_i)\neq b_i$	**Q.** divisible by 5
C. Number of invertible functions	**R.** divisible by
D. Number of many one functions	**S.** divisible by 3
	T. not possible

Answer: A-PQRS; B-PRS; C-PQRS; D-PS;

Solution: Match the items of Column I with those of Column II.
A function is defined as $f:\{a_1a_2a_3al_4a_5a_6\}\to\{b_1b_2b_3\}$

Column I	**Column II**
a) Number of surjective functions	p) divisible by 9
b) Number of functions in which $f(ai)\neq bi$	q) divisible by 5
c) Number of invertible functions	r) divisible by 4
d) Number of many one functions	s) divisible by 3
	t) not divisible

30 Match The Following

Column I	Column II
A. A non-differentiable point of $f(x)=[x]+[1-x],x\in(-1,3)$	**P.** 2
B. The derivative of $\tan^{-1}\left(\dfrac{2x\sqrt{1-x^2}}{1-2x^2}\right)$ w.r.t $\tan^{-1}\left(\dfrac{\sqrt{1+x^2}-1}{x}\right)$ at x = 0	**Q.** 0
C. An integral vale of 'a' such that $f(x)=x^3-ax^2+x+1$ possesses at every	**R.** 4

point on it, a tangent making acute angle with positive direction of x-axis is

D. Let $f(x)=\begin{cases} x+3, & x\in[1,2] \\ 6-x, & x\in[4,5] \end{cases}$ then the number of points of intersection of y = f(x) and $y=f^{-1}(x)$ is

S. 3

T. 1

Answer: A-PQT; B-R; C-QT; D-P;

Solution: A) $f(x)=[x]+1+[-x], x\in(-1,3)$

Not diff at 0,1,2

B) Let $\left.\begin{aligned} y&=\tan^{-1}\left(\frac{2\sin\theta\cos\theta}{\cos 2\theta}\right)=2\sin^{-1} \\ z&=\tan^{-1}\left(\frac{\sec\phi-1}{\tan\phi}\right)=\frac{1}{2}.\tan^{-1}x \end{aligned}\right\} \frac{dy}{dx}=\frac{\frac{2}{\sqrt{1-x^2}}}{\frac{1}{2}\left(\frac{1}{1+x^2}\right)}=4$ (at x = 0)

C) $\frac{dy}{dx}>0\Rightarrow 3x^2-2ax+1>0\ \forall x\in R$

$\Delta<0\Rightarrow 4(a^2-3)<0\Rightarrow a\in(-\sqrt{3},\sqrt{3})\Rightarrow a=-1,0,1$

D) $f(x)=\begin{cases} x+3, & x\in[1,2] \\ 6-x, & x\in[4,5] \end{cases}$

$f^{-1}(x)=\begin{cases} x-3, & x\in[4,5] \\ 6-x, & x\in[1,2] \end{cases}$

Then $f(x)=f^{-1}(x)\Rightarrow x+3=6-x$ or 6 – x = x – 3

$\Rightarrow \left.\begin{aligned} x&=\frac{3}{2} \\ y&=\frac{9}{2} \end{aligned}\right\}$ or $\left.\begin{aligned} x&=\frac{9}{2} \\ y&=\frac{3}{2} \end{aligned}\right\}$

$\left(\frac{3}{2},\frac{9}{2}\right)$ or $\left(\frac{9}{2},\frac{3}{2}\right)$

No.of points of intersection = 2

31 Let $f(x)=|x|+|x^2-1|+1$ and if

$G_1=$ {set of points of local maxima}

$G_2=$ {set of points of local minima}

$G_3=$ {set of non-differentiable points}

$G_4 =$ {set of points where derivative zero}

Then match the following

Column I	Column II
A. $n(G_1)$	**P.** 5
B. $n(G_2)$	**Q.** 4
C. $n(G_3)$	**R.** 3
D. $n(G_4)$	**S.** 2

Answer: A-S; B-R; C-R; D-S;

Solution: $f(x)=\begin{cases} x^2-x & ,-\infty<x<-1 \\ -x^2-x+2, & -1\le x<0 \\ -x^2+x+2, & 0\le x<1 \\ x^2+x & ,1\le x<\infty \end{cases} \Rightarrow f^1(x)=\begin{cases} 2x-1 & ,-\infty<x<-1 \\ -2x-1, & -1<x<0 \\ -2x+1, & 0<x<1 \\ 2x+1 & ,1<x<\infty \end{cases}$

	L.D	R.D		
-1	-3	1	not diff	local min
0	-1	1	not diff	local min
1	-1	3	not diff	local min

Also $f^1(x)=0 \Rightarrow x=\frac{-1}{2}$, $x=\frac{1}{2}$

(local max) (local max)

32 For $0<x<1$, match the following

Column I	Column II
A. $\int \frac{dx}{(1-\sqrt{x})\sqrt{1-x}}$	**P.** $2\left(\frac{\sqrt{x}+1}{\sqrt{1-x}}\right)+c$
B. $\int \frac{dx}{(1+\sqrt{x})\sqrt{1-x}}$	**Q.** $2\left(\frac{1-\sqrt{x}}{\sqrt{1-x}}+\sin^{-1}\sqrt{x}\right)+c$
C. $\int \frac{dx}{(1-\sqrt{x})\sqrt{x-x^2}}$	**R.** $2\left(\frac{\sqrt{x}-1}{\sqrt{1-x}}\right)+c$
D. $\int \frac{dx}{(1+\sqrt{x})\sqrt{x-x^2}}$	**S.** $2\left(\frac{1+\sqrt{x}}{\sqrt{1-x}}-\sin^{-1}\sqrt{x}\right)+c$

Answer: A-R; B-Q; C-P; D-R;

Solution: Put $n = \sin^2\theta$

33 Match the following Column-I with Column-II

Column I	Column II
A. $\int_0^{\frac{\pi}{2}} \frac{dx}{1+\sqrt{\cot x}}$	**P.** $\frac{\pi}{2}$
B. $\int_{-1}^{1} \frac{d}{dx}\left(Tan^{-1}\frac{1}{x}\right)dx$	**Q.** $-\frac{\pi}{4}$
C. $\int_{-\pi}^{\pi} \frac{\cos^2 xdx}{1+a^x}$	**R.** $\frac{\pi}{4}$
D. If $\int \frac{dx}{1+\sin x} = Tan\left(a+\frac{x}{2}\right)+b$	**S.** $-\frac{\pi}{2}$

Answer: A-R; B-S; C-P; D-Q;

Solution: B) $I = \int_{-1}^{1} \frac{-1}{1+x^2} = -2\int_0^1 Tan^{-1}x = -2\left(\frac{\pi}{4}\right) = -\frac{\pi}{2}$

C) $2I = 2\int_0^{\pi} \cos^2 x\,dx \Rightarrow I = 2\int_0^{\frac{\pi}{2}} \cos^2 x\,dx = \frac{\pi}{2}$

34 $f(x) = x^2 + 4x + 3$ then

Column I	Column II
A. No. of non differentiable points of |f(x)|	**P.** 3
B. No. of non differentiable points of f(|x|)	**Q.** 1
C. No. of non differentiable points of |f(|x|)|	**R.** 2
D. The minimum value of |f(|x|)| is	**S.** 5

Answer: A-R; B-Q; C-Q; D-P;

Solution: $f(x) = x^2 + 4x + 3$

A) $|\,f(x)\,|$ graph

No. of non differentiable points two

B) $f(|\,x\,|) = f(x), \quad x \ge 0 \;= f(-x) \quad x < 0$

No. of non differentiable point one

C) $|f(|x|)| = f(|x|)$ graphs are equal $\therefore$ No. of non differentiable points one

D) Mini value of |f(|x|)| is 3

35 Match the following Column-I with Column-II

Column I	Column II
A. If the subnormal at any point on the curve $y = 3^{1-k} \cdot x^k$ is of constant length then k is equal to	**P.** 1
B. If k be the slope of common tangent to the curves $y^2 = 4x$ and $x^2 = 32y$ then k is equal to	**Q.** 2
C. The value of k for which the area of the triangle included between the axes and any tangent to the curve $x^k y = 1$ is constant is	**R.** -1/2
D. If $kx^2 - 6y^2 = 1$ and $9x^2 + 6y^2 = 1$ intersect orthogonally then -9/k equal to	**S.** 1/2

Answer: A-S; B-R; C-P; D-Q;

Solution: A) $y = 3^{1-k} \cdot x^k$

$m = \frac{dy}{dx} = k.3^{1-k} \cdot x^{k-1}$

$S.N = \lambda$

$k \cdot 3^{2-2k} \cdot x^{2k-1} = \lambda \Rightarrow k = \frac{1}{2}$

B) Slope of common tangent $= -\left(\frac{a}{b}\right)^{1/3} = -\frac{1}{2}$

C) $y = \frac{1}{x^k}$

Slope $m = \frac{-k}{x_1^{k+1}}$

Tangent line $kx + x_1^{k+1} y = (k+1)x_1$

Area of the triangle $= \frac{(k+1)^2}{ak} x_1^{1-k}$

$1 - k = 0 \Rightarrow k = 1$

D) $\frac{-9}{k} = 2$