KV ACADEMY

2ND YEAR MATHS-2B MOST IMPORTANT QUESTIONS

GUNSHOT QUESTIONS -2026

Q NO. 18 TOPIC – CIRCLES

1. Find the equation of the circle passing through the points
   (i) A(1,2), B(3,-4), C(5-6) (ii) A(3,4), B(3,2), C(1,4)
2. If (2, 0), (0, 1), (4, 5) and (0, C) are concyclic then find C.
3. Show that the following four points in each of following are concyclic (9,1), (7,9), (-2,12), (6,10)
4. (a) Find the equation of circle passing through (4,1) (6,5) and having center on the line 4x+3y-24=0
   (b)Find the equation of circle whose center lies on the X-axis and passing through (-2,3) and (4,5).

Q NO. 19 TOPIC – CIRCLES

1. Show that the circle
   (i) $x^2+y^2-6x-2y+1=0$, $x^2+y^2+2x-8y+13=0$ (ii) $x^2+y^2-6x-9y+13=0$, $x^2+y^2-2x-16y=0$,
   (iii) $x^2+y^2-4x-6y-12=0$ & $x^2+y^2+6x+18y+26=0$ touch each other. Find the point of contact and equation of common tangent.
2. Find the pair of tangents drawn from (3,2) to the circle $x^2+y^2-6x+4y-2=0$
3. Find the pair of tangents drawn from (1,3) to the circle $x^2+y^2-2x+4y-11=0$ and also find the angle between them.
4. Find the equation of the circle which touches the circle $x^2+y^2-4x+6y-12=0$ internally at (-1,-1) with radius 2.

Extra

5. Find direct common tangents to circles. $x^2+y^2+22x-4y-100=0$, $x^2+y^2-22x+4y+100=0$.
6. Find the equation to the pair of transverse common tangent to the circles $x^2+y^2-4x-10y+28=0$ and $x^2+y^2+4x-6y+4=0$

Q NO. 20 TOPIC - PARABOLA

1. Derive the standard form of the parabola.
2. Show that the equation of common tangents to the circles $x^2+y^2=2a^2$ and the parabola $y^2=8ax$ are $y=\pm(x+2a)$
3. If y_1, y_2, y_3 are the y-coordinates of the vertices of the triangles inscribed in the parabola $y^2=4ax$ then show that area of the triangle is $\frac{1}{8a}|(y_1-y_2)(y_2-y_3)(y_3-y_1)|$ sq.units.

extra

4. Find the coordinate of vertex, focus, equation of directrix and axis for the parabola $y^2+4x+4y-3=0$
5. Find the equation of parabola passing through the point and having its axis parallel to the x-axis.
   a)(-1,2), (1,-1),(2,1) b) (-2,1) (1,2) (-1,3).
6. Find the equation of parabola whose axis is parallel to y – axis and which passes through the points (4,5) (2,11) (-4,21).

Q NO. 21 TOPIC - INTEGRATIONS

1. (a) Evaluate the reduction formula for $I_n = \int sin^n x dx$ and hence find $\int sin^4 x dx$.
   (b) Evaluate the reduction formula for $I_n = \int cos^n x dx$ and hence find $\int cos^4 x dx$.
2. (a) Evaluate $\int tan^n x dx$ and hence evaluate $\int tan^5 x dx$, $\int tan^6 x dx$.
   (b) Obtain reduction formula $I_n = \int cot^n x dx$ and hence find $\int cot^4 x dx$.
3. (a) Obtain reduction formula $I_n = \int sec^n x dx$ and hence find $\int sec^5 x dx$.
   (b) Obtain reduction formula $I_n = \int cosec^n x dx$ and hence find $\int cosec^5 x dx$.
4. If $I_n = \int (logx)^n dx$ then show that $I_n = x(logx)^n - n I_{n-1}$, and hence and find $I_n = \int (logx)^4$

Q NO. 22 TOPIC - INTEGRATIONS

1. a. Evaluate $\int \frac{dx}{1+cosx+sinx}$ b. Evaluate $\int \frac{dx}{5+4\,cos2x}$
2. Evaluate $\int \frac{9\cos x - sinx}{4\sin x + 5\cos x} dx$
3. a. Evaluate $\int \frac{x+1}{x^2+3x+12} dx$ b. Evaluate $\int \frac{x+1}{\sqrt{x^2-x+1}} dx$

extra

4. Evaluate $\int \frac{1}{(1+x)\sqrt{3+2x-x^2}} dx$ b. Evaluate $\int \frac{1}{x(x+1)(x+2)} dx$

Q NO. 23 TOPIC – DEFINITE INTEGRATIONS

1. (a)Evaluate $\int_0^{\pi/4} \log(1+\tan x) dx$ (b) Evaluate $\int_0^1 \frac{\log(1+x)}{1+x^2} dx$
2. (a) Evaluate $\int_0^{\pi} \frac{x}{1+sinx} dx$ (b). Evaluate $\int_0^{\pi} \frac{x \sin x}{1+cos^2 x} dx$

EXTRA

(3). Evaluate $\int_0^{\pi/4} \frac{\sin x + \cos x}{9+16\sin 2x} dx$ 4. Evaluate $\int_0^{\pi/2} \frac{sin^2 x}{\cos x + \sin x} dx$

Q NO. 21 TOPIC DIFFERENTIAL EQUATIONS

1) tan ydx +tan xdy=0
2) $\frac{dy}{dx} = \frac{xy+y}{xy+y}$
3) (2x+2y+3) $\frac{dy}{dx}$ = x+y+1 4) $\frac{dy}{dx}$ + y sec x = tan x
5) $\sqrt{1+x^2}$ dx + $\sqrt{1+y^2}$ dy =0

EXTRA

1. Solve the differential equation $(x^2+y^2)dx-2xydy$
2. Give solution of $x \sin^2 \frac{y}{x} dx = ydx - xdy$ passing through the point $(1,\pi/4)$
3. Solve $(x^2y-2xy^2)dx = (x^3-3x^2y)dy$
4. solve the differential equation $\frac{dy}{dx}$ + y tanx =sinx
5. solve the differential equation $\frac{dy}{dx} = \frac{x-y+3}{2x-2y+5}$
6. solve the differential equation (2x+y+1)dx+(4x+2y-1)dy=0

2ND YEAR MATHS-2B MOST IMPORTANT QUESTIONS

SAQ 4 MARKS

Q NO. 11 TOPIC – CIRCLES

1) (i) Find the length of chord intercepted by the circle $x^2 + y^2+8x-4y -16 = 0$ on the line $3x-y+4=0$
(ii) Find the length of chord intercepted by circle $x^2 + y^2-x+3y -22 = 0$ on the line $y = x – 3$
(iii) Find the length of the chord by $x^2 + y^2 = a^2$ on the line $x\cos\alpha + y\sin\alpha = p$

2(a) Find the pole $3x + 4y- 45 = 0$ w.r.t $x^2+ y^2-6x -8y + 5 = 0$.

(b) Find the value of k, if $x+y–5=0$ & $2x+ky–8=0$ are conjugate w. r. t. the circle $x^2 + y^2 – 2x – 2y – 1 = 0$

(c) Find the value of k,if $kx+3y – 1 = 0$, $2x+y+5=0$ are conjugate w. r. t. the circle $x^2 + y^2– 2x – 4y – 4= 0$

3(a) Find the eqn. of the circle with center (-2, 3) cutting a chord length 2 units on $3x+4y+4=0$

3(b) Find the eqn of circle which touches the circle $x^2+y^2 –2x–4y–20=0$ externally at (5, 5) with radius 5.

4 Find the angle between the tangents drawn from (3,2) to the circle $x^2 +y^2-6x+4y-2=0$

EXTRA

1. (i)If a pt 'p' is moving such that the lengths of tangents drawn from 'p' to the circles $x^2 +y^2 –4x–6y–12=$ & $x^2+y^2 +6x+18y+26=0$ are in the ratio 2:3 then find the equation of the locus of P.
(ii) Find the length of the chord intercepted by the circle $x^2 +y^2-8x-2y-8=0$ on the line $x+y+1=0$
2. Find the equations of tangents to the circle $x^2 + y^2 – 4x + 6y – 12 = 0$ which are parallel to $x + y – 8 = 0$.

Q NO. 12

1. Find the equ of circle which cuts orthogonally the circle $x^2+y^2-4x+2y-7=0$ & having the center at (2,3)
2. Find the radical center of the circles $X^2 + y^2 – 4x – 6y + 5 = 0$, $x^2 + y^2 – 2x – 4y – 1 = 0$ and $x^2 + y^2 – 6x – 2y = 0$

3) show that the angle between the circles $X^2 + y^2= a^2$ $X^2 + y^2= ax+ay$ is $\frac{3\pi}{4}$

4) Find the equation of common chord of the following pair of circles.
(i) $x^2 + y^2-4x-4y+3=0$, $x^2 + y^2-5x-6y+4=0$ (ii) $x^2 + y^2+2x+3y+1=0$, $x^2 + y^2+4x+3y+2=0$

5) Find the equation of common tangent of the following pair of circles at their point of contact .
(i) $x^2 + y^2 +10x -2y +22=0$, $x^2 + y^2 - 2x- 8y+8=0$ (ii) $x^2 + y^2 – 8y -4=0$, $x^2 + y^2-2x-4y=0$

EXTRA

1(a) Find the equation of the circle passing through the points of intersection of the circles $x^2+y^2-8x-6y+21=0$, $x^2+y^2-2x-15=0$ & (1,2)

(b). Find the equation of the circle which cuts the circles $x^2+y^2-4x-6y+11=0$ & $x^2+y^2-10x-4y+21=0$ orthogonally and ha diameter along the straight line $2x+3y-7$.

3(a) Find the equation of the circle passing through the origin, having its center on the line $x+y=4$ & intersecting the circle $x^2+y^2-4x+2y+4=0$ orthogonally.

4. Find the equation of circle which is orthogonal to following circles.
(i) $x^2+y^2+2x+4y+1=0$, $2x^2+2y^2+6x+8y-3=0$ & $x^2+y^2-2x+6y-3=0$
(ii) $x^2+y^2+2x+17y+4=0$, $x^2+y^2+7x+6y+11=0$ & $x^2+y^2-x+22y+3=0$

5(a) Show that the circle $x^2+y^2+2ax+c=0$ and $x^2+y^2+2by+c=0$ touch each other if $\frac{1}{a^2}+\frac{1}{b^2}=\frac{1}{c}$

5(b) If the two circles $x^2+y^2+2gx+2fy=0$ & $x^2+y^2+2g'x+2f'y=0$ touch each other, then Show that $f'g = fg'$

QNO. 13 and Q NO. 14 TOPIC –ELLIPSE

1) **Find the equation the ellipse in the standard from such that the distance between foci is 8 and distance between directrices is 32.**
2) Find the eccentricity of the ellipse in standard form , if irs length of latus rectum is equal to half of its major axis
3) Find the equation of tangents to **$9x^2 + 16y^2 = 144$. Which makes equal intercept on coordinate axis.**
4) Find the equation for the tangent to the ellipse **$2x^2 + 2y^2 = 3$ which are perpendicular to x+y+2=0**
5) **Find the equation of the ellipse referred to it's major and minor axes as coordinate axes x,y respectively with latus rectum of length 4 and distance between foci $4\sqrt{2}$.**
6) **Find the equation the ellipse in the standard from whose distance foci 2 and the length of the latus rectum is 15/2.**
7). **Find the length of major axis, minor axix, latus rectum, eccentricity, coordinates of center, foci and the equations of directrices of the ellipse $9x^2 + 16y^2 = 144$.**
8) **Find the equation of the tangent and normal to the ellipse $x^2 + 8y^2 = 33$ at (-1,2)**
9) **Find the equation of the tangent and normal to the ellipse $x^2 + 2y^2 - 4x + 12y + 14 = 0$ at (2,-1)**
10) **Find the equation of the line $x \cos \alpha + y \sin \alpha = p$ to be a tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.**

EXTRA

1. **Find the value of 'k' if the line $4x + y + k = 0$ is tangent to the Ellipse $x^2 + 3y^2 = 3$.**
2. **Find the equation of the tangents to the ellipse 2x2 + 3y2 = 11 at the point whose ordinate 'l'.**
3. **If P is a point on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ whose foci S and S^{l} then show that SP + S^{l}P = 2a**
4. **Find eccentricity, coordinates of foci, length of latus rectum and equations of directrices of the ellipses $9x^2 + 16y^2 - 36x + 32y - 92 = 0$.**
5. **Find the equation of tangent and normal to the ellipse $9x^2 + 16y^2 = 144$ at the end of latus rectum in th first quadrant.**

Q NO. 15

1(a) **Find the equation of the Tangents to the Hyperbola $3x^2 - 4y^2 = 12$ which are (i) parallel and (ii) Perpendicular to the line y = x – 7**

(b) **Find the equations of the tangents to the hyperbola $x^2 - 4y^2 = 4$. Which are (i) parallel (ii) perpendicula to the line x+2y=0**

2) **One focus of a hyperbola is located at the point (1,-3) and the corresponding directrix is the line y=2. Find the equation of the hyperbola if its eccentricity is 3/2.**

3. **Find the center, eccentricity, foci, length of latus rectum and equations of the directrices of the hyperbola (i) $x^2 - 4y^2 = 4$. (ii) $16y^2 - 9x^2 = 144$.**

4. **Find the center, eccentricity, foci, equations of the directrices, length of the latusrectum of the hyperbola of the hyperbola**
(i)$9x^2 - 16y^2 + 72x - 32y - 16 = 0$. (ii)$4x^2 - 9y^2 - 8x - 32 = 0 = 4$.

EXTRA

4. **Show that angle between the two asymptotes of the hyperbola $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is $2 \tan^{-1}\left(\frac{b}{a}\right)$ or $2 \sec^{-1}$ (e)**

5. **Tangents to the hyperbola $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ make angles Θ_1 and Θ_2 with transverse axis of hyperbola. Show that the point of intersection of these tangents lies on curve $2xy = k(x^2 - a^2)$ when $\tan \Theta_1 + \tan \Theta_2 = k$.**

Q NO. 16 TOPIC –DEFINITE INTEGRATIONS

1) $\int_0^{\frac{\pi}{2}} \frac{\sin^2 x - \cos^2 x}{\sin^3 x + \cos^3 x}\, dx$ 2.Find $\int_0^{\pi} \frac{dx}{3+2\cos x}$

3(a). Find $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{\sqrt{\sin x}}{\sqrt{\sin x}+\sqrt{\cos x}}\, dx$ 3(b).Find $\int_0^{\frac{\pi}{2}} \frac{a\sin x + b\cos x}{\sin x + \cos x}\, dx$

4. Find (i) $\int_0^{\frac{\pi}{2}} \sin^5 x \cos^4 x\, dx$ (ii) $\int_0^{\frac{\pi}{2}} \sin^6 x \cos^4 x\, dx$

5 $Find\ (i) \int_0^{\frac{\pi}{2}} \sin^4 x \cos^5 x\, dx$ (ii) $\int_0^{\frac{\pi}{2}} \sin^7 x\, dx$ (iii) $\int_0^{\frac{\pi}{2}} \cos^8 x\, dx$

EXTRA

1. Find the area bounded by the curves y = sin x and y = cos x between any two consecutive points of intersection.

Q NO. 17 TOPIC –DIFFERENTIAL EQUATIONS

1. Find the general solution of $x+y\frac{dy}{dx} = 0$
2. Find the general solution of $\frac{dy}{dx} = e^{x+y}$
3. Solve y (1+X) dx + (1+Y)dy = 0
4. Solve the differential equation

i) $\frac{dy}{dx} = \frac{1+y^2}{1+x^2}$ ii) $\frac{dy}{dx} = e^{x-y} + x^2 e^{-y}$

KV ACADEMY

VSAQ 2 MARKS

Q NO. 1 & 2 CIRCLES

1. Find the equation of circle with centre (1, 4) and radius 5.
2. If the circle $x^2 + y^2 - 4x + 6y + a = 0$ has radius 4 then find a.
3. Find the equation of the circle passing through the origin and having the centre at (–4, –3).
4. If $x^2 + y^2 + 2gx + 2fy - 12 = 0$ represents a circle with centre (2, 3) find g, f and its radius.
5. If $x^2 + y^2 - 4x + 6y + c = 0$ represents a circle with radius 6 then find the value of c.
6. Find the equations of the circles for which the points given below are the end points of a diameter (1, 2), (4, 6)
7. Find the pole of $x - 2y + 22 = 0$ with respect to $x^2 + y^2 - 5x + 8y + 6 = 0$.
8. Find the value of k if x + y –5 = 0 and $2x + ky - 8 = 0$ are conjugate with respect to the circle $x^2 + y^2 - 2x - 2y - 1 = 0$.
9. Find the center and radius of the circle $x^2 + y^2 - 4x - 8y - 41 = 0$
10. Find the value 'a' if $2x^2 + ay^2 - 3x + 2y - 1 = 0$ represents a circle and also find its radius.
11. (a)Find the value of k, if the points (4,2) and (k, –3)are conjugate with respect to the circle $x^2 + y^2 = 35$
    (b)Find the value of k, if the points (1,3) and (2, k)are conjugate with respect to the circle $x^2 + y^2 - 5x + 8y + 8 = 0$
12. Find the polar of (1,2) with respect to $x^2 + y^2 = 7$.
13. Obtain the parametric equation of the circle $(x - 3)^2 + (y - 4)^2 = 8^2$
14. If the length of a tangent from (5,4) to the circle $x^2 + y^2 + 2ky = 0$ is 'l', then find 'k'.

Q No.3 SYSTEM OF CIRCLES

1) Show that the circles given by the following equation intersect each other orthogonally $x^2 + y^2 + 4x - 2y - 11 = 0,\ x^2 + y^2 - 4x - 8y + 11 = 0$
2. **Find the pole of ax + by + c = 0 ($c \neq 0$) with respect to $x^2 + y^2 = r^2$.**
3. **Find the other end of the diameter of the circle $x^2 + y^2 - 8x - 8y + 27 = 0$. If one end of it is (2,3).**
4. **Find the equation of the normal at P (3,5) of the circle $S = x^2 + y^2 - 10x - 2y + 6$.**
5. **If the center of circle $x^2 + y^2 + ax + by - 12 = 0$ is (2,3) find the values of a, b and the radius of circle.**

Q No.3

1. **Find the value of k if the line $2y = 5x + k$ is a tangent to the parabola $y^2 = 6x$.**
2. **Find the condition for the line y = mx + c to be a tangent to the parabola $x^2 = 4ay$.**
3. **Find the equation of the common chord of the pair of circles $x^2 + y^2 - 4x - 4y + 3 = 0$, $x^2 + y^2 - 5x - 6y + 4 = 0$**
4. **Find the angle between the circles**
   (i)$x^2 + y^2 - 12x - 6y + 41 = 0$ and $x^2 + y^2 + 4x + 6y - 59 = 0$.
   (ii) $x^2 + y^2 + 4x - 14y + 28 = 0$ and $x^2 + y^2 + 4x + 6 - 5 = 0$.
5. **(a) If circles $x^2 + y^2 - 5x - 14y - 34 = 0$, $x^2 + y^2 + 2x + 4y + k = 0$ are orthogonal, then find k.**
   (b) If circles $x^2 + y^2 - 6x - 8y + 12 = 0$, $x^2 + y^2 - 4x + 6y + k = 0$ are orthogonal, then find k.

Q No.4

1. Find the product of lengths of the perpendiculars from any point on the hyperbola $\frac{x^2}{16} - \frac{y^2}{9} = 1$ t its asymptotes.
2. Find the equation of the parabola $y^2 = 6x$ at the positive end of the latus rectum.
3. Find the coordinates of the points on the parabola $y^2 = 2x$ whose focal distance is $\frac{5}{2}$
4. Find the equation of the parabola whose vertex is (3 – 2) and the focus is (3,1)

5(a). Find the coordinates of the points on the parabola $y^2 = 8x$, whose focal distance is 10 units.

5(b). If (1/2,2) is one extremity of a focal chord of the parabola $y^2 = 8x$ find the coordinates of the other extremity.

Q No.5

1. If the angle between the asymptotes of a hyperbola is 30° then find its eccentricity.
2. If the eccentricity of a hyperbola is 5/4, then find the eccentricity of its conjugate hyperbola.
3. If e, e_1 are the eccentricities of a hyperbola and its conjugate hyperbola, prove that $\frac{1}{e^2} + \frac{1}{e_1^2} = 1$.
4. Find the eccentricity and length of latus rectum of the hyperbola $16y^2 - 9x^2 = 144$.
5. If $3x - 4y + k = 0$ is a tangent to $x^2 - 4y^2 = 5$ find the value of k.

QNO-6&7

1) (i) $\int \cot^2 dx$ (ii) $\int \left(x + \frac{1}{x}\right)^3 dx$ (iii) $\int \left(x^3 - 2x^2 + 3\right) dx$ (iv) $\int x^2 + 3x - 1 \,/2x dx$

(iv) Evaluate $\int \left(1 + \frac{2}{3} - \frac{3}{x^2}\right) dx$ (v) $\int \left(x + \frac{4}{1+x^2}\right) dx$ (vi) $\int \left(\sec^2 x - \cos x + x^2\right) dx$

(vii) $\int \left(x^3 - cosx + \frac{4}{\sqrt{x^2+1}}\right) dx$ (viii) $\int \left(\frac{1}{coshx + sinhx}\right) dx$

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

(2) (a) $\int e^x \left(\tan^{-1} x + \frac{1}{1+x^2}\right) dx$ (b) $\int e^x (sinx + cosx) dx$ (c) $\int e^x \left(\frac{1+xlogx}{x}\right) dx$

3. Evaluate $\int \frac{e^x(1+x)}{cos^2(xe^x)}$ dx
4. Evaluate $\int sec^2x.csc^2x dx$
5. Evaluate the integral $\int \frac{sin^2 x}{1+cos\,2x}$ dx
6. Evaluate $\int \left(\frac{1}{(x+3)\sqrt{x+2}}\right) dx$

7(a) Evaluate $\int \frac{x^8}{1+x^{18}}$ dx (b) Evaluate $\int \frac{sin(logx)}{x}$ dx (c) $\int \frac{logx}{x^2}$

Q No.8&9

1(a) Evaluate $\int_0^2 |1 - x| dx$ (b) Evaluate $\int_0^4 |2 - x| dx$

1) Find $\int_0^2 (x^2 + 1) dx$ as the limit of a sum

2) Evaluate (i) $\int_1^2 x^5 dx$ (ii) $\int_0^\pi sinx dx$ (iii) $\int_0^a \frac{dx}{x^2+a^2}$

3) Evaluate (i) $\int_0^a (a^2 x - x^3)\, dx$ (ii) $\int_0^1 \frac{dx}{\sqrt{3-2x}}$ (iii) $\int_0^1 xe^{-x^2}\, dx$

(iv) $\int_1^5 \frac{dx}{\sqrt{2x-1}}$ (v) $\int_0^4 \frac{x^2}{\sqrt{1+x}}$ (vi) $\int_2^3 \frac{2x}{1+x^2}$ dx

4) Evaluate $\int_0^\pi \sqrt{2 + 2cos\theta}\, d\theta$

5) Evaluate $\int_0^{\pi/2} \frac{sin^5 x}{sin^5 x + cos^5 x}$ dx

QNO 10

1. Find the order & degree to the differential equation $\left[\frac{d^2y}{dx^2} - \left(\frac{dy}{dx}\right)^3\right]^{\frac{6}{5}} = 6y$
2. Find the order and degree of the D.E $x^{1/2}\left(\frac{d^2y}{dx^2}\right)^{1/3} + x\left(\frac{dy}{dx}\right)^2 - e^x = 4$
3. (a) Find the order and degree of the D.E $\left(\frac{d^2y}{dx^2}\right)^3 - 3\frac{dy}{dx} + y = 0$

   (b)Form the D.E corresponding to $y=cx - 2c^2$ where c is a parameter.

   © Find the order and degree of the differential equation $\frac{d^2y}{dx^2} = -P^2y$
4. Find the order and degree of the differential equation $\frac{d^2y}{dx^2} = \left[1 + \left(\frac{dy}{dx}\right)^2\right]^{\frac{5}{3}}$
5. Form the differential equation corresponding to y = Acos3x+Bsin3x, where A&B are parameters.