# VERY IMPORTANT QUESTIONS

## MATH 2B

### VSAQs

### Chapter 01: CIRCLE

1) Find the equation of the circles with centre 'c' & radius 'r' where $c=(-1,2)$ and $r=5$.

2) Find centre & radius of circles, eqn is $x^2+y^2-4x-8y-41$

3) Find the equation of the circle passing through origin & having the centre at $(-4,-3)$

4) If $x^2+y^2-4x+6y+c=0$ represents a circle with radius 6, find the value of 'c'.

5) Locate the position of the point 'p' with respect to the circle $S=0$ when $p(4,2)$ & $S=2x^2+2y^2-5x-4y-3=0$

6) Find the eqn of the normal at 'P' of the circle $S=0$ where P & S are given by $p=(3,5)$

$S\equiv x^2+y^2-10x-2y+6=0$

7) Find the chord of contact $(1,1)$ to the circle $x^2+y^2=9$

8) Find the polar of $(3,-1)$ with respect to the $2x^2+2y^2=11$

9) Find the value of 'K' if the points $(1,3)$ & $(2,K)$ are conjugate pts with respect to the circle $x^2+y^2=35$

### Ch-02: SYSEM OF CIRCLES

10) Find 'k' if the following pairs of circles are orthogonal $x^2+y^2+4x+8=0$, $x^2+y^2-16y+k=0$

11) Find 'K' $x^2+y^2+2by-K=0$, $x^2+y^2+2ax+8=0$

12) Find the equation of the radical axis of the following circles $x^2+y^2-3x-4y+5=0$

$3(x^2+y^2)-7x+8y-11=0$

13) Find the eqn of the common chord of the following pair of circles $x^2+y^2+2x+3y+1=0$, $x^2+y^2+4x+3y+2=0$

14) Find eqn of radical Axis $x^2+y^2+4x+6y-1=0$ & $4(x^2+y^2)+8x+12y-9=0$.

15) Find the eqn of common chord of $x^2+y^2-4x-4y+3=0$, $x^2+y^2-5x-6y+4=0$.

## Ch-03: PARABOLA

16) Find the equation of the parabola whose vertex is $(3,-2)$ and focus is $(3,1)$.

17) Find the co-ordinates of the points on the Parabola $y^2=2x$ whose focal distance is $\frac{5}{2}$

18) Parabola $y^2=8x$ & focal distance is 10, find co-ordinates.

19) Find the position (interior or exterior or on) of the following point w.r.t parabola $y^2=6x$.

20) Find the eqn of the normal to the parabola $y^2=4x$ which is parallel to $y-2x+5=0$.

21) Show that line $2x-y+2=0$ is a tangent to the Parabola $y^2=16x$. Find point of contact also.

22) Find 'k' if the line $2y=5x+k$ is a tangent to the parabola $y^2=6x$.

## Ch:05: HYPERBOLA

23) If the eccentricity of a hyperbola is $\frac{5}{4}$, then find the eccentricity of conjugate hyperbola.

24) Define Rectangular hyperbola.

25) P.T $\frac{1}{e^2}+\frac{1}{e_1^2}=1$, $e_1, e_2$ are eccentries of hyperbola & its conjugate respectively

26) If $3x-4y+k=0$ is a tangent to $x^2-4y^2=5$ find the value of 'k'.

27) Find the eqn of Hyperbola, foci are $(\pm 5, 0)$ the transverse axis of length 8.

## Ch:06: INTEGRATION

28) Evaluate $\int \sqrt[3]{2x^2}\,dx$ on $(0,\infty)$

29) $\int \left(\frac{1}{1-x^2} + \frac{1}{1+x^2}\right) dx$ on $(-1,1)$

30) $\int \sec^2 x \operatorname{cosec}^2 x\,dx$

31) $\int \sqrt{1-\cos 2x}\,dx$

32) $\int \frac{(a^x-b^x)^2}{a^x b^x}\,dx$.

33) $\int \frac{1}{(x+3)\sqrt{x+2}}\,dx$ on $IC(-2,\infty)$

34) $\int 2x \sin(x^2+1)\,dx$, $x \in R$.

35) $\int e^{\tan x}\,dx$.

36) $\int 2x e^{x^2}\,dx$ on $R$

37) $\int \sqrt{16-25x^2}\,dx$ on $\left(-\frac{4}{5}, \frac{4}{5}\right)$

38) $\int \frac{x^8}{1+x^{18}}\,dx$ on $R$

39) $\int \frac{1}{x \log x}\,dx$ on $(1,\infty)$

40) $\int \frac{\sin 2x}{a\cos^2 x + b\sin^2 x}\,dx$ on $IC R$

41) $\int e^x \left[\frac{1+x\log x}{x}\right] dx$ on $(0,\infty)$

42) $\int (\tan x + \log\sec x) e^x dx$, $n \in \mathbb{Z}$

## Ch:07: DEFINITE INTEGRALS

43) Evaluate as limit of sum. $\int_0^5 (x+1)dx$

44) $\int_0^2 |1-x|\,dx$

45) $\int_0^4 |2-x|\,dx$

46) $\int_0^{\pi/2} \frac{\sin^5 x}{\sin^5 x + \cos^6 x}\,dx$

47) $\int_2^3 \frac{2x}{1+x^2}\,dx$.

48) $\int_0^{\pi} \sqrt{2+2\cos\theta}\,d\theta$.

49) $\int_0^a (\sqrt{a}-\sqrt{x})^2 dx$.

50) $\int_0^1 \frac{x^2}{x^2+1}\,dx$

51) Find $\int_0^{\pi/2} \sin^7 x\,dx$

52) $\int_0^{\pi/2} \cos^8 x\,dx$

53) $\int_0^{\pi/2} \sin^{10} x\,dx$

54) $\int_0^{\pi/2} \cos^{11} x\,dx$

55) $\int_0^{2\pi} \sin^2 x \cos^4 x\,dx$

56) Find the region enclosed by the curves $y=e^x$, $y=x$, $x=0$, $x=1$

## Ch:08: DIFFERENTIAL EQUATIONS

57) Find the order & degree of $\left(\frac{d^3y}{dx^3}\right)^2 - 3\left[\frac{dy}{dx}\right]^2 - e^x = 4$

58) Find order & degree of $\left[\left(\frac{d^2y}{dx^2}\right) + \left(\frac{dy}{dx}\right)^3\right]^{6/5} = 6y$.

59) Find order & degree of D.E of the family of all circles with their centres at the origin.

60) Find D.E to $y = A\cos 3x + B\sin 3x$ where A, B are Parameters.

61) Find the General soln of $x + y\frac{dy}{dx} = 0$

62) G.S of $\frac{dy}{dx} = e^{x+y}$

63) G.S of $\frac{dy}{dx} = \frac{2y}{x}$.

## SAQs

### Ch-01: CIRCLE

1) If the length of tangent from (2,5) to the circle $x^2+y^2-5x+4y+k=0$ is $\sqrt{37}$ then find k.

2) Find the length of the chord intercepted by the circles $x^2+y^2-x+3y-22=0$ on the line $y=x-3$

3) Find the length of the chord formed by $x^2+y^2=a^2$ on the line $x\cos\alpha + y\sin\alpha = p$

4) Find the equation of the tangent and normal at (3,2) of the circle $x^2+y^2-x-3y-4=0$.

5) The line $y=mx+c$ and the circle $x^2+y^2=a^2$ intersect at A and B. If $AB=2\lambda$ then show that $c^2 = (1+m^2)(a^2-\lambda^2)$

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

## Ch:02 : SYSTEM OF CIRCLES

7) Find the eqn of the circle which passes through the origin and intersects the circles below orthogonally. $x^2+y^2-4x+6y+10=0$
$x^2+y^2+12y+6=0$.

8) Find the eqn of circles $x^2+y^2-4x-6y-3=0$;
$x^2+y^2-8y+12=0$.

9) S.T the angle between the circles $x^2+y^2=a^2$, $x^2+y^2=ax+ay$ is $\frac{3\pi}{4}$

10) Find the eqn of the circle which cuts orthogonally the circle $x^2+y^2-4x+2y-7=0$ & having the centre at (2,3)

11) S.T the circles $x^2+y^2-8x-2y+8=0$ and $x^2+y^2-2x+6y+6=0$ touch each other and find the point of contact.

12) Find the radical centre of the following circles.
$x^2+y^2-4x-6y+5=0$
$x^2+y^2-2x-4y-1=0$
$x^2+y^2-6x-2y=0$

## Ch:05 : HYPERBOLA

13) Find the equation of tangents to the hyperbola $3x^2-4y^2=12$ which are (i) Parallel & (ii) $\perp$ to line $y=x-7$

14) Find the centre, foci, eccentricity, equation of the directrices, length of the latus rectum of the following hyperbolas $x^2-4y^2=4$

15) S.T the angle b/w the two asymptotes of a hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is $2\tan^{-1}\left(\frac{b}{a}\right)$ or $2\sec^{-1}(e)$

## Ch: 07: Definite Integrals

16) Evaluate $\int_{\pi/6}^{\pi/3} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}}\, dx$

17) Evaluate $\int_0^{\pi/2} x \sin x\, dx$.

18) $\int_0^{\pi/2} \frac{dx}{4 + 5\cos x}$

19) $\int_0^{\pi/2} \frac{a\sin x + b\cos x}{\sin x + \cos x}\, dx$

20) $\int_0^{\pi/4} \log(1 + \tan x)\, dx$.

21) $\int_{-a}^{a} x^2 (a^2 - x^2)^{3/2}\, dx$

22) Find the area of the region enclosed by the curves $y = x^2$, $y = 2x$

## Ch: 08: Differential Equations

23) Solve D.E $\frac{dy}{dx} = e^{x-y} + x^2 e^{-y}$

24) Solve $(e^x + 1)\, y\, dy + (y+1)\, dx = 0$

25) Solve $\frac{dy}{dx} = \frac{xy + y}{xy + x}$.

26) Solve $(xy^2+x)dx+(yx^2+y)dy=0$

27) Solve $\frac{dy}{dx}+1=e^{x+y}$.

28) Solve $(x^2+y^2)dx=2xydy$.

## LAQs

### ch.01: CIRCLE

1) Find the equation of a circle which passes through $(2,-3)$ and $(-4,5)$ and having centre on $4x+3y+1=0$

2) Find the eqn of circle passing through $(3,4)$ $(3,2)$ $(1,4)$

3) S.T following four pts are concyclic & find eqn of circle

(i) $(1,1)$, $(-6,0)$, $(-2,2)$, $(-2,-8)$

(ii) $(9,1)$, $(7,9)$, $(-2,12)$, $(6,10)$.

4) find 'c' if $(2,0)$ $(0,1)$ $(4,5)$ are concyclic.

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

6) Find the transverse common tangents of the circles $x^2+y^2-4x-10y+28=0$ & $x^2+y^2+4x-6y+4=0$

7) Find the eqn of the circle which touches circle $x^2+y^2-2x-4y-20=0$ externally at $(5,5)$ with radius 5!

8) S.T the four common tangents can be drawn for the circles given by $x^2+y^2-14x+6y+33=0$ and $x^2+y^2+30x-4y+41=0$ & find internal & external centres of similitude.

9) Find the equation of a circle whose centre lies on the X-axis & passing through (-2,3) and (4,5)

## Ch:03: PARABOLA

10) Derive the eqn of Parabola in standard form

11) Find the eqn of Parabola whose axis is Parallel to X-axis & which passes through the Points (-2,1) (1,2) and (-1,3)

12) S.T the eqn of the common tangents to the circle $x^2+y^2=2a^2$ and the parabola $y^2=8ax$ are $y=\pm(x+2a)$

13) Find the co-ordinates of the Vertex and focus, the eqn of the directrix and axis of the following Parabolas $y^2+4x+4y-3=0$.

14) Find the eqn to the tangent to the parabola $y^2=6x$ at the positive end of the latus rectum.

## Ch:06: INTEGRATION

15) Evaluate $\int e^{ax}\sin(bx+c)\,dx$ ; $(a,b,c\in R, b\neq 0)$ on R

16) $\int \frac{dx}{4+5\sin x}$

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

18) $\int \frac{dx}{4\cos x + 3\sin x}$

19) $\int \frac{dx}{5+4\cos 2x}$

20) $\int \frac{2\cos x + 3\sin x}{4\cos x + 5\sin x}\, dx$

21) $\int \frac{dx}{x(x+1)(x+2)}$

22) obtain Reduction formula for $I_n = \int \cot^n x\, dx$, $n \geq 2$ & deduce $\int \cot^4 x\, dx$.

23) $I_n = \int \cos^n x\, dx$, $\int \cos^3 x\, dx$

24) $I_n = \int \sin^n x\, dx$, $\int \sin^4 x\, dx$

25) $I_n = \int \sec^n x\, dx$, $\int \sec^5 x\, dx$.

26) $I_n = \int \tan^n x\, dx$, $\int \tan^6 x\, dx$.

## Ch:07: DEFINITE INTEGRALS

27) $\int_0^{\pi/2} \frac{x}{\sin x + \cos x}\, dx = \frac{\pi}{2\sqrt{2}} \log(\sqrt{2}+1)$

28) $\int_0^{\pi/4} \frac{\sin x + \cos x}{9 + 16\sin 2x}\, dx$

29) $\int_0^{\pi} \frac{x}{1+\sin x}\, dx$

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

31) $\int_0^1 \frac{\log(1+x)}{1+x^2}\,dx$

32) Find $\int_0^{\pi} x \sin^{-1}x \cos^6 x\,dx$.

33) Find the area enclosed by the curves

$y^2 = 4x$, $y^2 = 4(4-x)$

## Ch:08: DIFFERENTIAL EQUATIONS

34) Solve the D.E $\sin^{-1}\left(\frac{dy}{dx}\right) = x+y$

35) solve $\frac{dy}{dx} = \tan^2(x+y)$

36) solve $(x^2+y^2) = dy\,2xy\,dx$

37) $\frac{dy}{dx} = \frac{4x+6y+5}{3y+2x+4}$

38) $\frac{dy}{dx} = \frac{2y+x+1}{2x+4y+3}$

39) Solve $\frac{dy}{dx} + y\tan x = \sin x$.

40) solve $(1+y^2)dx = (\tan^{-1}y - x)\,dy$.

41) Solve $(1-x^2)\frac{dy}{dx} + 2xy = x\sqrt{1-x^2}$

42) Solve $(1+x^2)\frac{dy}{dx} + y = \tan^{-1}x$.