Roll No. of Candidate _____

**MATHEMATICS** **Intermediate Part II Class 12th (1st A 423-III)** **GROUP: I**
**Time: 30 Minutes** Guj-12-1-23 **OBJECTIVE** **PAPER: II**
**Code: 8195** **Marks: 20**

**Note:** You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling of two or more circles will result in zero mark in that question.

1- 1- Equation of horizontal line through (3 , 1)
(A) $x=3$ (B) $x=1$ (C) $y=3$ (D) $y=1$

2- $\int \frac{1}{x}dx =$ _____
(A) $\ln x + c$ (B) $-\frac{1}{x^2}+c$ (C) $-\frac{1}{x}+c$ (D) $e^x+c$

3- It is not unit vector
(A) [1,0,0] (B) [0,1,0] (C) [1,1,1] (D) [0,0,1]

4- Eccentricity e of hyperbola is
(A) $e<1$ (B) $e>1$ (C) $e=1$ (D) $e=0$

5- Focus of parabola $x^2=-16y$ is _____
(A) (4,0) (B) (−4,0) (C) (0,4) (D) (0,−4)

6- $\frac{d}{dx}\sqrt{x} =$ _____
(A) $\frac{1}{2}$ (B) $\frac{1}{2}\sqrt{x}$ (C) $\frac{1}{2\sqrt{x}}$ (D) $\frac{2}{\sqrt{x}}$

7- $\frac{d}{dx}\left(\frac{1}{x^2}\right)$ at x=1 is _____.
(A) 2 (B) -2 (C) 1 (D) -1

8- $f(x)=2x^2+4x-2$, then $f(-2)=$ _____
(A) 0 (B) -1 (C) 2 (D) -2

9- $\int_0^1 \frac{1}{1+x^2}dx =$ _____
(A) $\pi$ (B) $\frac{\pi}{2}$ (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{4}$

10- Distance of point (−2,−3) from x-axis is
(A) 2 (B) -2 (C) 3 (D) -3

11- Radius of circle $x^2+y^2-4x+6y+9=0$ is
(A) 2 (B) 3 (C) 4 (D) 9

12- If f(x) has maximum value at x=c, then $f'(c)=0$ but $f''(x)$ is _____.
(A) negative (B) positive (C) zero (D) undefined

**(Turn over)**

13- Which one is constant function

(A) $f(x)=x$ (B) $f(x)=x^2$ (C) $f(x)=5$ (D) $f(x)=\sin x$

14- Vectors $\bar{a}=3\underline{i}-2\underline{j}+\underline{k}$ and $\underline{b}=\underline{i}-\underline{j}-x\underline{k}$ are perpendicular, then value of x is _____

(A) $-5$ (B) 5 (C) 1 (D) $-1$

15- Length of major axis of $\frac{x^2}{25}+\frac{y^2}{16}=1$ is

(A) 10 (B) 5 (C) 8 (D) 4

16- $x=2$ is solution of the inequality

(A) $2x-1\le 0$ (B) $2x-1\ge 0$ (C) $x-1\le 0$ (D) $x+1\le 0$

17- The lines represented by $ax^2+2hxy+by^2=0$ are orthogonal if

(A) $a+b=1$ (B) $a-b=0$ (C) $a+b=0$ (D) $a-b=1$

18- Solution of $\frac{dy}{dx}=2x$ is _____

(A) $y=x^2+c$ (B) $y=x+c$ (C) $y=\ln x+c$ (D) $y=e^x+c$

19- $\int 2\sec^2 2x\,dx=$ _____

(A) $\frac{\tan 2x}{2}+c$ (B) $\tan 2x+c$ (C) $\sec 2x+c$ (D) $\frac{\sec 2x}{2}+c$

20- $\frac{d}{dx}\sinh 2x=$ _____

(A) $2\cosh 2x$ (B) $2\sinh 2x$ (C) $-2\cosh 2x$ (D) $-2\sinh 2x$

**MATHEMATICS** **Intermediate Part II Class 12th (1stA 423)** **GROUP: I**
**Time: 2:30 hours** **PAPER: II**
**SUBJECTIVE** Guj-12-1-23 **Marks: 80**

Note: Section I is compulsory. Attempt any three (3) questions from Section II.

## SECTION I

**2. Write short answers to any EIGHT questions:** **(2 x 8 = 16)**

i- Show that the parametric equations $x = a\cos\theta$, $y = b\sin\theta$ represent the equation of ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

ii- Let the real valued functions 'f' and 'g' be defined by $f(x) = 2x+1$ and $g(x) = x^2-1$, obtain the expressions $fog(x)$ and $f^2(x)$

iii- Evaluate the limit $\lim\limits_{x\to 0}\frac{1-\cos 2x}{x^2}$

iv- Differentiate w.r.t.x $\frac{2x-1}{\sqrt{x^2+1}}$

v- Find $\frac{dy}{dx}$ if $x = at^2$ and $y = 2at$

vi- Find $\frac{dy}{dx}$ if $4x^2+2hxy+by^2+2gx+2fy+c=0$

vii- If $\tan y(1+\tan x) = 1-\tan x$, show that $\frac{dy}{dx} = -1$

viii- Find $y_2$ if $y = \ln\left(\frac{2x+3}{3x+2}\right)$

ix- Determine the intervals in which f is increasing or decreasing for the domain mentioned.
$f(x) = \sin x$ ; $x \in (-\pi, \pi)$

x- Find two positive integers whose sum is 30 and their product will be maximum.

xi- Define feasible region and feasible solution.

xii- Graph the feasible region of the following system of linear inequalities and find the corner points
$x+y \le 5$
$-2x+y \ge 2$
$x \ge 0$

**3. Write short answers to any EIGHT questions:** **(2 x 8 = 16)**

i- Find $\delta y$ if $y = x^2-1$ and x changes from 3 to 3.02

ii- Evaluate $\int\frac{(1-\sqrt{x})^2}{\sqrt{x}}dx$

iii- Find the anti-derivative of $x^2\ln x$

iv- Evaluate $\int\frac{e^{m\tan^{-1}x}}{1+x^2}dx$

v- Evaluate $\int_{\pi/6}^{\pi/3}\cos t\,dt$

vi- Find the area between x-axis and the curve $y = \sin 2x$ from $x = 0$ to $x = \frac{\pi}{3}$

vii- Solve the differential equation $\frac{dy}{dx} = \frac{1+y^2}{e^{-x}}$

viii- If $\underline{v} = 3\underline{i}-2\underline{j}+2\underline{k}$ and $\underline{w} = 5\underline{i}-\underline{j}+3\underline{k}$ then find $|3\underline{v}+\underline{w}|$



**(Turn over)**

 Guj-12-1-23

ix- Find direction cosines of vector $\overrightarrow{PQ}$ where P(2,1,5) and Q(1,3,1)

x- Find a vector perpendicular to each of the vectors $\underline{u} = 2\underline{i} + \underline{j} + \underline{k}$ and $\underline{v} = 4\underline{i} + 2\underline{j} - \underline{k}$

xi- Prove that $\underline{a} \times (\underline{b} + \underline{c}) + \underline{b} \times (\underline{c} + \underline{a}) + \underline{c} \times (\underline{a} + \underline{b}) = 0$

xii- Calculate the projection of $\underline{a} = \underline{i} - \underline{k}$ along $\underline{b} = \underline{j} + \underline{k}$

**(2 x 9 = 18)**

**4. Write short answers to any NINE questions:**

i- Find the point three-fifth of the way along the line segment from A(−5,8) to B(5,3)

ii- By means of slopes show that the points (−4,6), (3,8) and (10,10) lie on the same line.

iii- Find an equation of line with x-Intercept = −9 and slope is − 4

iv- Find measure of angle between the lines represented by $10x^2 - 23xy - 5y^2 = 0$

v- Find h such that the points A(−1, $h$), B(3,2) and $C$(7,3) are collinear.

vi- Find an equation of the line through (11,−5) and parallel to a line with slope − 24 .

vii- Find the co-ordinates of the point that divides the join of A(−6,3) and B(5,−2) externally in ratio 2:3

viii- Find centre and radius of the circle $4x^2 + 4y^2 - 8x + 12y - 25 = 0$

ix- Write down an equation of the parabola with focus (2,5) and directrix $y = 1$

x- Find an equation of circle of radius a and lying in 2nd Quadrant such that it is tangent to both the axes.

xi- Find focus, vertex of the parabola $x^2 = 4(y-1)$

xii- Find an equation of the hyperbola with given foci $(0, \pm 6), e = 2$

xiii- Find centre and foci of the hyperbola $\frac{y^2}{4} - x^2 = 1$

## SECTION II

Note: Attempt any three (3) questions.

**5-** **(a)** Express the limit in terms of e $\lim\limits_{x \to 0} \frac{e^{1/x} - 1}{e^{1/x} + 1}$, $x > 0$ **5**

**(b)** Find $\frac{dy}{dx}$ of the parametric equations $x = \frac{a(1-t^2)}{1+t^2}$, $y = \frac{2bt}{1+t^2}$ **5**

**6-** **(a)** Show that $\int \sqrt{a^2 - x^2}\, dx = \frac{a^2}{2} \text{Sin}^{-1}\left(\frac{x}{a}\right) + \frac{x}{2}\sqrt{a^2 - x^2} + c$ **5**

**(b)** Find an equation of the line through the point (2,−9) and intersection of the lines $2x + 5y - 8 = 0$ and $3x - 4y - 6 = 0$ **5**

**7-** **(a)** Evaluate $\int_0^{\pi/4} \cos^4 t\, dt$ **5**

**(b)** Maximize $f(x,y) = 2x + 5y$ subject to the constraints $2y - x \leq 8$ ; $x - y \leq 4$ ; $x \geq 0$ ; $y \geq 0$ **5**

**8-** **(a)** If $y = (\text{Cos}^{-1}x)^2$, prove that $(1-x^2)y_2 - xy_1 - 2 = 0$ **5**

**(b)** Write down an equation of the circle that passes through the given points A(−7,7), B(5,−1), C(10,0) **5**

**9-** **(a)** Find centre, foci, eccentricity, vertices and directrices of $x^2 + 16x + 4y^2 - 16y + 76 = 0$ **5**

**(b)** Prove that in any $\Delta ABC$ ; $a = b\text{Cos}C + c\text{Cos}B$ **5**

**Roll No. of Candidate** _____

**MATHEMATICS** **Intermediate Part-II , Class 12th ( 1stA 423- II )** **GROUP: II**

**Time: 30 Minutes** Guj-12-2-23 **OBJECTIVE** **PAPER: II**

**Code: 8194** **Marks: 20**

**Note:** You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling of two or more circles will result in zero mark in that question.

1- 1- $3\hat{i}\cdot(2\hat{j}\times\hat{k})=$

(A) 0 (B) 2 (C) 4 (D) 6

2- The co-ordinates of vertex of parabola $x+8-y^2+2y=0$ will be

(A) $(-9,1)$ (B) $(9,1)$ (C) $(9,-1)$ (D) $(-9,-1)$

3- Mid-point of hypotenuse of a right triangle is called as

(A) circumcentre (B) incentre (C) orthocentre (D) centroid

4- $x=0$ is the solution of inequality

(A) $3x-2>0$ (B) $3x+5<0$ (C) $2x-6<0$ (D) $x+3<0$

5- If a line intersects y-axis at $(0, a)$, then 'a' is called

(A) x-intercept (B) y-intercept (C) inclination (D) slope

6- $\int \text{Sin } 2x\,dx=$

(A) $-\frac{\text{Cos } 2x}{2}$ (B) $\frac{\text{Cos } 2x}{2}$ (C) $2\,\text{Cos } 2x$ (D) $-2\,\text{Cos } 2x$

7- $\int \tan x\,dx=$

(A) lnCosx (B) $\ln|\text{Secx}|$ (C) lnSinx (D) $\ln|\text{Cotx}|$

8- If $f(x)=\text{Sin}x$, then $f'(\pi)=$

(A) -1 (B) 1 (C) 0 (D) $\frac{1}{2}$

9- $\frac{d}{dx}\left(\frac{2}{x}\right)=$

(A) $\ln|x^2|$ (B) $\frac{-2}{x^2}$ (C) $-2x^2$ (D) $2^x$

10- $\lim_{x\to 3}(2x+4)=$

(A) 3 (B) 6 (C) 10 (D) 12

11- $\text{Cos}\theta=$

(A) $\hat{a}\cdot\hat{b}$ (B) $|\underline{a}\times\underline{b}|$ (C) $\underline{a}\times\underline{b}$ (D) $\text{Sin}\theta$

12- The focus of parabola $y^2=4ax$ is

(A) $(0, a)$ (B) $(-a, 0)$ (C) $(a, 0)$ (D) $(0,-a)$

**(Turn over)**

13- Two circles are said to be concentric if they have same _____.
(A) radius (B) diameter (C) center (D) length

14- If a line is parallel to x-axis, then inclination =
(A) $0^o$ (B) $30^o$ (C) $45^o$ (D) $90^o$

15- $\int \sqrt{x}\, dx =$
(A) $\frac{\sqrt{x}}{2}$ (B) $\frac{x\sqrt{x}}{3}$ (C) $\frac{1}{2\sqrt{x}}$ (D) $\frac{2x\sqrt{x}}{3}$

16- $y = mx + c$ is _____ form of equation of line.
(A) normal (B) point-slope (C) slope-intercept (D) intercept

17- If $f(x) = \sqrt{x-12}$, then $f(16) =$
(A) 16 (B) 12 (C) 28 (D) 2

18- If $y = \ln(\sin x)$, then $\frac{dy}{dx} =$
(A) $\tan x$ (B) $\cot x$ (C) $-\tan x$ (D) $-\cot x$

19- If $y = \cosh 2x$, then $\frac{dy}{dx} =$
(A) $2\sinh 2x$ (B) $-\sinh 2x$ (C) $-2\sinh 2x$ (D) $\cosh 2x$

20- $\int_0^{\pi/2} \cos x\, dx =$
(A) 2 (B) 0 (C) -1 (D) 1

**MATHEMATICS** **Intermediate Part-II , Class 12th ( 1stA 423 )** **GROUP: II**
**Time: 2:30 hours** **PAPER: II**
**SUBJECTIVE** Guj-12-2-23 **Marks: 80**

Note: Section I is compulsory. Attempt any three (3) questions from Section II.

SECTION I

**2. Write short answers to any EIGHT questions:** **(2 x 8 = 16)**

i- Prove that $\text{sech}^2x = 1 - \text{Tanh}^2x$

ii- Evaluate $\lim_{x\to 3}\frac{x-3}{\sqrt{x}-\sqrt{3}}$

iii- Find $\lim_{x\to\pi}\frac{\text{Sin}x}{\pi - x}$

iv- If $y = x^4 + 2x^2 + 2$, prove that $\frac{dy}{dx} = 4x\sqrt{y-1}$

v- Differentiate Sinx w.r.t Cotx

vi- If $y = \text{Cot}^{-1}\left(\frac{x}{a}\right)$, find $\frac{dy}{dx}$

vii- If $f(x) = \ln(e^x + e^{-x})$, find $f'(x)$

viii- If $y = \text{Tanh}^{-1}(\text{Sin}x)$, find $\frac{dy}{dx}$

ix- If $y = \sqrt{x} + \frac{1}{\sqrt{x}}$, find $y_2$

x- Find the interval in which f(x) is increasing, $f(x) = 4 - x^2$, $x \in (-2,2)$

xi- Define problem constraints.

xii- Graph the solution set of linear inequality in xy-plane, $3x + 7y \geq 21$

**3. Write short answers to any EIGHT questions:** **(2 x 8 = 16)**

i- Using differentials find $\frac{dy}{dx}$, if $xy + x = 4$

ii- Evaluate $\int (2x+3)^{1/2}\,dx$

iii- Evaluate $\int \frac{\text{Sec}^2x}{\sqrt{\text{tan}x}}dx$

iv- Evaluate $\int e^{-x}(\text{Cos}x - \text{Sin}x)\,dx$

v- Evaluate $\int_{-1}^{2}(x + |x|)\,dx$

vi- Find the area bounded by Cos function from $x = -\frac{\pi}{2}$ to $x = \frac{\pi}{2}$

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

viii- If O is the origin and $\overrightarrow{OP} = \overrightarrow{AB}$, find the point P when A and B are (-3,7) and (1,0) respectively.

ix- Find a unit vector in the direction of $\underline{v} = \underline{i} + 2\underline{j} - \underline{k}$

x- Find $\alpha$ so that $\underline{u}$ and $\underline{v}$ are perpendicular $\underline{u} = 2\alpha\underline{i} + \underline{j} - \underline{k}$ and $\underline{v} = \underline{i} + \alpha\underline{j} + 4\underline{k}$

xi- Find a unit vector perpendicular to the plane containing $\underline{a}$ and $\underline{b}$ ,where $\underline{a} = 2\underline{i} - 6\underline{j} - 3\underline{k}$ , $\underline{b} = 4\underline{i} + 3\underline{j} - \underline{k}$

xii- Given a force $\vec{F} = 2\underline{i} + \underline{j} - 3\underline{k}$ acting at a point A(1,-2,1). Find the moment of $\vec{F}$ about the point B(2,0,-2)

**(Turn over)**

Guj-12-2-23

**4. Write short answers to any NINE questions:** **(2 x 9 = 18)**

i- Show that the points A(0,2), B($\sqrt{3}$,−1) and C(0,-2) are vertices of a right triangle.

ii- The two points P(3,2) and O′(1,3) are given in XY-coordinate system. Find the XY-coordinates of P referred to the translated axes O′X and O′Y

iii- Find K so that the line joining A(7,3), B(K,-6) and the line joining C(-4,5), D(-6,4) are parallel.

iv- Find an equation of the vertical line through (-5,3)

v- Find the distance from the point P(6,-1) to the line $6x-4y+9=0$

vi- Find point of intersection of the lines $x-2y+1=0$ and $2x-y+2=0$

vii- Find measure of the angle between the lines represented by $x^2-xy-6y^2=0$

viii- Find an equation of the circle with centre at (5,-2) and radius 4

ix- Check the position of the point (5,6) with respect to the circle $x^2+y^2=81$

x- Find the focus and vertex of parabola $x^2=-16y$

xi- Find equation of ellipse with foci $(\pm 3,0)$ and minor axis of length 10

xii- Find the centre and foci of $x^2-y^2=9$

xiii- Find the point of intersection of the given conics $x^2+y^2=8$ and $x^2-y^2=1$

## SECTION II

Note: Attempt any three (3) questions.

**5- (a)** If $f(x)=\begin{cases}\dfrac{\sqrt{2x+5}-\sqrt{x+7}}{x-2}, & x\neq 2\\ k, & x=2\end{cases}$ **5**

Find value of k so that f is continuous at $x=2$

**(b)** Differentiate $\text{Cos}x^2$ from the first principle. **5**

**6- (a)** Evaluate $\int e^{2x}\,\text{Cos}\,3x\,dx$ **5**

**(b)** Find the area of the region bounded by the triangle with vertices $(a,b+c),(a,b-c)$ and $(-a,c)$ **5**

**7- (a)** Solve the differential equation $y-x\dfrac{dy}{dx}=2\left(y^2+\dfrac{dy}{dx}\right)$ **5**

**(b)** Minimize $z=2x+y$ subject to constraints $x+y\geq 3$, $7x+5y\leq 35$, $x\geq 0$, $y\geq 0$ **5**

**8- (a)** If $x=a(\theta+\text{Sin}\theta)$, $y=a(1+\text{Cos}\theta)$ then, show that $y^2=\dfrac{d^2y}{dx^2}+a=0$ **5**

**(b)** Find an equation of the circle which passes through the points A(5,10), B(6,9) and C(-2,3) **5**

**9- (a)** Find an equation of the ellipse with centre (0,0), major axis horizontal, the points (3,1),(4,0) lie on the graph. **5**

**(b)** Find the volume of the tetrahedron whose vertices are A(2,1,8), B(3,2,9), C(2,1,4) and D(3,3,10) **5**