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)

 Guj-12-2-23

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 $y = \ln(\text{Sin}x)$, then $\frac{dy}{dx} =$
(A) $\tan x$ (B) Cotx (C) $-\tan x$ (D) $-\text{Cot}x$

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

20- $\int_0^{\pi/2} \text{Cos}x\, dx =$
(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 $\text{sech}^2 x = 1 - \text{Tanh}^2 x$

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

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

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

(b) Differentiate $\cos x^2$ from the first principle. **5**

6- (a) Evaluate $\int e^{2x}\cos 3x\,dx$ **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 $x=a(\theta+\sin\theta)$, $y=a(1+\cos\theta)$ 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**