Roll No. of Candidate _____

MATHEMATICS **Intermediate Part-II , Class 12th (1stA 424- IV)** **GROUP: I**
Time: 30 Minutes **OBJECTIVE** **PAPER: II**
Code: 8197 GUJ-1-24 **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- $\int \text{Secx Tanx dx} = ?$

(A) Secx + c (B) $\text{Sec}^2\text{x} + c$ (C) Tanx + c (D) ln |Secx + tanx| + c

2- The focus of parabola $x^2 = -16y$ is

(A) (0 , –4) (B) (0 , 0) (C) (4 , 0) (D) (–4 , 0)

3- $\int_0^2 |x|\,dx$ is

(A) 0 (B) 1 (C) 2 (D) 4

4- Derivative of $y = f(x)$ at $x = a$ represents slope of

(A) tangent line at $x = a$ (B) secant line (C) perpendicular line (D) straight line

5- Projection of vector $\underline{v}$ along vector $\underline{u}$ is

(A) $\frac{\underline{u}\cdot\underline{v}}{|\underline{u}|}$ (B) $\frac{\underline{u}\cdot\underline{v}}{|\underline{v}|}$ (C) $\frac{\underline{u}\cdot\underline{u}}{|\underline{u}|}$ (D) $\frac{\underline{v}\cdot\underline{v}}{|\underline{v}|}$

6- Which one is true?

(A) $\underline{i}\times\underline{i} = \underline{i}$ (B) $\underline{i}\cdot\underline{i} = \underline{i}$ (C) $\underline{k}\times\underline{k} = 0$ (D) $\underline{k}\times\underline{i} = -\underline{j}$

7- Which one equation represents a circle?

(A) $y^2 = 8x$ (B) $3x^2 + 3y^2 = 9$ (C) $3x^2 + 5y^2 = 9$ (D) $x^2 - 2y = 0$

8- Which one is point-slope form of a straight line?

(A) $y = mx + c$ (B) $y - y_1 = m(x - x_1)$ (C) $\frac{x}{a} + \frac{y}{b} = 1$ (D) $\frac{x}{a} - \frac{y}{b} = 1$

9- Order of differential equation $\frac{d^2y}{dx^2} + \frac{dy}{dx} - 2x = 0$ is

(A) 1 (B) 0 (C) 2 (D) 3

10- The interval in which $f(x) = 4 - x^2$; $x \in (-2, 2)$ is increasing

(A) (0 , 2) (B) (–2 , 0) (C) (–2 , 2) (D) (0 , 1)

11- The function $f(x) = \frac{x^2 - 1}{x - 1}$ is not defined at

(A) $x = 0$ (B) $x = 1$ (C) $x = 2$ (D) $x = -1$

12- If $f(x) = x^{2/3}$, the $f'(8)$ is

(A) 3 (B) $\frac{1}{3}$ (C) $\frac{2}{3}$ (D) $\frac{1}{2}$

13- $\int \frac{f'(x)}{f(x)}dx = ?$

(A) $\ln|x| + c$ (B) $\ln|f(x)| + c$ (C) $\ln|f'(x)| + c$ (D) $\ln f(x)\cdot f'(x) + c$

14- Slope of the line passing through the points (0 , –1) and (7 , –15) is

(A) 2 (B) 0 (C) 1 (D) –2

15- $\lim_{x\to-\infty}(e^x) = ?$

(A) ∞ (B) $-\infty$ (C) 1 (D) 0

16- $[\underline{u}\ \underline{v}\ \underline{v}] = ?$

(A) 1 (B) –1 (C) 0 (D) $\underline{v}$

17- Which point is not solution of inequality $x - 2y \le 6$

(A) (1 , 1) (B) (0 , –1) (C) (14 , 0) (D) (–4 , 0)

18- Major axis of ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ with $(a > b)$ is

(A) $x = 0$ (B) $y = 0$ (C) $x = 1$ (D) $y = 1$

19- Derivative of $\text{Tan}^{-1}x$ w.r.t. x is

(A) $\frac{1}{1 - x^2}$ (B) $\frac{1}{x^2 - 1}$ (C) $\frac{1}{1 + x^2}$ (D) $1 + x^2$

20- Distance of line $5x + 12y + 39 = 0$ from origin is

(A) 3 (B) 5 (C) 12 (D) 39

MATHEMATICS Intermediate Part-II , Class 12th (1stA 424) GROUP: I
Time: 2:30 hours PAPER: II
SUBJECTIVE Gr VJ-I-24 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- Let $f(x) = x^2 - x$, find the value of $f(x-1)$.

ii- State the domain and range of f^{-1} if $f(x) = \frac{1}{x+3}$

iii- Evaluate $\lim_{x \to \pi} \frac{\sin x}{\pi - x}$

iv- Express $\lim_{n \to \infty} \left(1 + \frac{3}{n}\right)^{2n}$ in term of e.

v- Differentiate $\frac{x^2+1}{x^2-3}$ w.r.t. 'x'

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

vii- Prove that $\frac{d}{dx}(\cot^{-1} x) = \frac{-1}{1+x^2}$

viii- Differentiate $\left(\cos\sqrt{x} + \sqrt{\sin x}\right)$ w.r.t 'x'

ix- Find $\frac{dy}{dx}$ if $y = \sin h^{-1}(ax + b)$

x- Find $\frac{dy}{dx}$ if $y = \log_{10}(ax^2 + bx + c)$

xi- Find $f'(x)$ if $f(x) = \frac{e^x}{e^{-x}+1}$

xii- Define a stationary point.

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

i- Use differential to find $\frac{dy}{dx}$, if $xy - \ell nx = c$

ii- Evaluate $\int \frac{\left(1-\sqrt{x}\right)^2}{\sqrt{x}} dx$, $(x > 0)$

iii- Find $\int \sec x \, dx$

iv- Integrate $\int \sin^{-1} x \, dx$

v- Evaluate $\int e^x (\cos x - \sin x) \, dx$

vi- Calculate $\int_1^2 \frac{x}{x^2+2} dx$

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

viii- Find an equation of vertical line through (–5 , 3).

ix- Write the equation of line in two intercepts form.

x- Convert $15y - 8x + 3 = 0$ in slope intercept form.

xi- Find the equation of line passing through A(–6 , 5) having slope 7.

xii- Show that the points A(–1 , 2) , B(7 , 5) and C(2 , –6) are vertices of right triangle.

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

i- What is feasible region?

ii- Derive equation of circle in standard form.

iii- Write an equation of circle with centre $(-3, 5)$ and radius 7.

iv- Check the position of point $(5, 6)$ with respect to circle: $2x^2 + 2y^2 + 12x - 8y + 1 = 0$

v- Find equation of hyperbola with foci $(0, \pm 9)$, directrices $y = \pm 4$.

vi- Find the focus and directrix of the parabola if $x^2 = 5y$.

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

viii- Indicate the solution set of system of linear inequality by shading $4x - 3y \leq 12$; $x \geq -\frac{3}{2}$

ix- Define equal vector, give an example.

x- Find the magnitude and direction cosines of $\underline{v} = 4\underline{i} - 5\underline{j}$

xi- Find scalar "α" so that the vectors $2\underline{i} + \alpha\underline{j} + 5\underline{k}$ and $3\underline{i} + \underline{j} + \alpha\underline{k}$ are perpendicular.

xii- Which vectors, if any, are parallel or perpendicular
$\underline{u} = \underline{i} + 2\underline{j} - \underline{k}$, $\underline{v} = -\underline{i} + \underline{j} + \underline{k}$, $\underline{w} = \frac{-\pi}{2}\underline{i} - \pi\underline{j} + \frac{\pi}{2}\underline{k}$

xiii- Prove that the vectors $\underline{i} - 2\underline{j} + 3\underline{k}$, $-2\underline{i} + 3\underline{j} - 4\underline{k}$ and $\underline{i} - 3\underline{j} + 5\underline{k}$ are coplanar.

SECTION II

5- (a) Evaluate $\lim_{\theta \to 0} \frac{\tan\theta - \sin\theta}{\sin^3\theta}$ **5**

(b) If $\tan y(1 + \tan x) = 1 - \tan x$, show that $\frac{dy}{dx} = -1$ **5**

6- (a) If $x = \sin\theta, y = \sin m\theta$, show that $(1 - x^2)y_2 - xy_1 + m^2 y = 0$ **5**

(b) Evaluate $\int \frac{\sqrt{2}}{\sin x + \cos x} dx$ **5**

7- (a) Evaluate $\int_0^{\frac{\pi}{4}} \frac{1}{1 + \sin x} dx$ **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) Find the length of the chord cut off from the line $2x + 3y = 13$ by the circle $x^2 + y^2 = 26$. **5**

(b) Prove that in any ΔABC, $b^2 = c^2 + a^2 - 2ca\cos B$ **5**

9- (a) Find the interior angles of a triangle with vertices $A(-2, 11)$, $B(-6, -3)$ and $C(4, -9)$ **5**

(b) Find the centre, foci, eccentricity, vertices and directrices of the Ellipse $x^2 + 4y^2 = 16$ **5**

Roll No. of Candidate _____

MATHEMATICS **Intermediate Part-II , Class 12th (1st A 424- IV)** **GROUP: II**
Time: 30 Minutes **OBJECTIVE** **PAPER: II**
Code: 8198 GUJ-2-24 **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- Differential of $\sqrt{x}$ is

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

2- If a = b then equation $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ represent

(A) Ellipse (B) Circle (C) Parabola (D) Hyperbola

3- Degree of differential equation $\frac{d^2y}{dx^2}+\frac{dy}{dx}-3x=0$ is

(A) 0 (B) 2 (C) 1 (D) 3

4- $\frac{d}{dx}(\text{Sin}\ln x)=?$

(A) $\frac{e^x-e^{-x}}{2}$ (B) $\frac{e^x+e^{-x}}{2}$ (C) e^x-e^{-x} (D) e^x+e^{-x}

5- Magnitude of a vector $\underline{v}=-\underline{i}+\underline{j}$ is

(A) a (B) $\sqrt{2}$ (C) $-\sqrt{2}$ (D) $\sqrt{3}$

6- If dot product of two non-zero vectors is zero then vectors will be

(A) perpendicular (B) parallel (C) collinear (D) all of these

7- Length of latus ractum of parabola $y^2 = 4ax$ is

(A) 2a (B) 4ax (C) 4a (D) $\frac{1}{2a}$

8- Every homogeneous equation $ax^2+2hxy+by^2=0$ represent two real lines through origin if

(A) $h^2-ab<0$ (B) $h^2-ab>0$ (C) $h^2=ab$ (D) both (B) and (C)

9- If α is constant then $\int \cot\alpha\, dy$ is

(A) Sinα + c (B) –Sinα + c (C) xSinα + c (D) ycotα + c

10- If $f(x)=\text{Cos}x$, then $f'\left(\frac{\pi}{2}\right)$ is

(A) –1 (B) 1 (C) 0 (D) $\frac{1}{2}$

11- $\lim_{x\to a}\frac{x^3-a^3}{x-a}=?$

(A) $3a^2$ (B) a^2 (C) 0 (D) un-defined

12- Derivative of $\sqrt{x}$ at x = a is

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

(Turn over)

13- $\int \frac{\ell nx}{x} dx$ is equal to

(A) $\ell n\,(\ell nx) + c$ (B) $\frac{(\ell nx)^2}{2} + c$ (C) $\ell nx + c$ (D) $\frac{\ell nx}{2} + c$

14- Slope intercept form of a line is

(A) $y = mx + c$ (B) $\frac{x}{a} + \frac{y}{b} = 1$ (C) $x = 0$ (D) $y = 0$

15- The function $f(x) = \frac{2+3x}{2x}$ is not continuous at

(A) $x = 3$ (B) $x = 0$ (C) $x = -\frac{2}{3}$ (D) $x = 1$

16- $\frac{1}{6}[\underline{u}\ \underline{v}\ \underline{w}]$ is formula to calculate

(A) area of triangle (B) volume of parallelpipped

(C) volume of tetrahedron (D) area of parallelogram

17- (2 , 1) is solution of in-equality

(A) $2x + y > 5$ (B) $x - 2y > 1$ (C) $3x - 5y < 7$ (D) $2x + y < 5$

18- Eccentricity of hyperbola is

(A) $e < 1$ (B) $e = 0$ (C) $e = 1$ (D) $e > 1$

19- $\frac{d}{dx}\left[\frac{1}{g(x)}\right]$ is equal to

(A) $\frac{1}{[g(x)]^2}$ (B) $\frac{-g'(x)}{g(x)}$ (C) $\frac{-1}{[g(x)]^2}$ (D) $\frac{-g'(x)}{[g(x)]^2}$

20- Distance of point (Cos3x , Sin3x) from origin is

(A) 9 (B) 6 (C) 3 (D) 1

MATHEMATICS **Intermediate Part-II , Class 12th (1stA 424)** **GROUP: II**

Time: 2:30 hours **PAPER: II**

SUBJECTIVE GUJ-2-24 **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- Define rational function. Give one example also.

ii- Find gof(x) , when $f(x)=\sqrt{x+1}$; $g(x)=\frac{1}{x^2}$, $x\neq 0$

iii- Evaluate $\lim_{\theta\to 0}\frac{1-\cos\theta}{\theta}$

iv- Find 'c' so that $\lim_{x\to -1} f(x)$ exists, when $f(x)=\begin{cases} x+2 & , \ x\leq -1 \\ c+2 & , \ x>-1 \end{cases}$

v- Differentiate $(x^2+5)(x^3+7)$ w.r.t x.

vi- Find derivative of $\tan^3\theta \sec^2\theta$ w.r.t θ.

vii- Find $\frac{dy}{dx}$, if $y=\sinh^{-1}\left(\frac{x}{2}\right)$

viii- Define critical value and critical point of function f.

ix- Differentiate $\cot^{-1}\left(\frac{x}{a}\right)$ w.r.t x.

x- Find derivative of $\frac{x^2+1}{x^2-3}$ w.r.t x.

xi- State product rule for derivative of two functions.

xii- Differentiate $\sin^2 x$ w.r.t $\cos^4 x$.

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

i- Find δy 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- Evaluate $\int\frac{dx}{x(\ln 2x)^3}$; $(x>0)$

iv- Evaluate $\int x\tan^2 x\,dx$

v- Evaluate $\int\frac{e^x(1+x)}{(2+x)^2}dx$

vi- Evaluate $\int_0^{\pi/6} x\cos x\,dx$

vii- Solve the differential equation $\sin y \operatorname{Cosec} x\frac{dy}{dx}=1$

viii- Find the distance and midpoint of line joining A(–8 , 3) and B(2 , –1).

ix- Find an equation of line with x-intercept:–9 and slope:–4

x- Transform the equation $5x-12y+39=0$ into slope intercept form.

xi- Determine the value of P such that the lines $2x-3y-1=0$, $3x-y-5=0$ and $3x+Py+8=0$ meet at a point.

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

(Turn over)

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

i- Define feasible region.

ii- Graph the feasible region of inequality $3x+2y\geq 6$, $x\geq 0$, $y\geq 0$

iii- Write an equation of circle with centre (5 , –2) and radius 4.

iv- Write down equation of tangent to $x^2+y^2=25$ at (4 , 3)

v- Find the focus and vertex of parabola $y^2=8x$

vi- Write equation of the ellipse whose foci $(\pm 3, 0)$ and minor axis of length 10.

vii- Find the foci and eccentricity of $\frac{x^2}{4}-\frac{y^2}{9}=1$

viii- Find the length of tangent drawn from point (–5 , 4) to the circle $x^2+y^2-2x+3y-26=0$

ix- Find a unit vector in the same direction of the vector $\underline{v}=[3,-4]$

x- Write the direction cosine of vector $\underline{v}=-\hat{i}+\hat{j}+\hat{k}$

xi- Find a scalar 'α' so that vectors $2\hat{i}+\alpha\hat{j}+5\hat{k}$ and $3\hat{i}+\hat{j}+\alpha\hat{k}$ are perpendicular.

xii- If $\underline{a}=4\hat{i}+3\hat{j}+\hat{k}$ and $\underline{b}=2\hat{i}-\hat{j}+2\hat{k}$, find $|\underline{a}\times\underline{b}|$

xiii- A force $\underline{F}=4\hat{i}-3k$ passes through A(2 , –2 , 5). Find its moment about B(1 , –3 , 1).

SECTION II

5- **(a)** Evaluate : $\lim_{\theta\to 0}\frac{1-\cos p\theta}{1-\cos q\theta}$ **5**

(b) Differentiate : $\text{Sec}^{-1}\left(\frac{x^2+1}{x^2-1}\right)$ w.r.t "x" **5**

6- **(a)** If $y=e^x\text{Sin}x$; show that $\frac{d^2y}{dx^2}-2\frac{dy}{dx}+2y=0$ **5**

(b) Evaluate : $\int \text{Cosec}^3 x\,dx$ **5**

7- **(a)** Evaluate : $\int_0^{\pi/4}\frac{\text{Sin}x-1}{\text{Cos}^2x}dx$ **5**

(b) Graph the feasible region of the following system of linear inequalities and find the corner points **5**

$2x-3y\leq 6$

$2x+3y\leq 12$

$x\geq 0$, $y\geq 0$

8- **(a)** Find an equation of the circle passing through the points A(1 , 2) and B(1 , –2) and touching the line $x+2y+5=0$ **5**

(b) Use vectors, to prove that the diagonals of a parallelogram bisect each other. **5**

9- **(a)** Find the equation of perpendicular bisector of a segment joining the points A(3 , 5) and B(9 , 8). **5**

(b) Find the equation of parabola with focus (–3 , 1) and directrix x = 3. **5**