Paper Code Number: 4192	2025 (1st-A) INTERMEDIATE PART-II (12th Class)	Roll No: _____

MATHEMATICS PAPER-II GROUP-II

TIME ALLOWED: 30 Minutes | **OBJECTIVE** | **MAXIMUM MARKS: 20**

Q.No.1 You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question.

S.#	QUESTIONS	A	B	C	D
1	$\sinh^2 x - \cosh^2 x =$	-1	1	0	2
2	If $f(x) = \sqrt{x}$, then $f^{-1}(x)$ is:	x	x^2	$-x$	$\frac{1}{x}$
3	$\frac{d}{dx}\left(\ell n\left(\frac{1}{x}\right)\right) =$	$\frac{1}{x}$	$-\frac{1}{x}$	$\frac{1}{x^2}$	x^2
4	$\frac{d}{dx}(\tanh^{-1} x) =$	$\frac{1}{1+x^2}$	$\frac{-1}{1+x^2}$	$\frac{-1}{1-x^2}$	$\frac{1}{1-x^2}$
5	$\frac{d^3}{dx^3}(x^2+1) =$	0	1	$3x^2$	$2x$
6	If $f(x) = 4 - x^2$, then $f(x)$ decreases in interval:	$(-2, 0)$	$(0, 2)$	$(-3, -2)$	$(-1, 1)$
7	$\int x^n dx = \frac{x^{n+1}}{n+1} + c$ is not valid for:	$n = 1$	$n = 0$	$n = 2$	$n = -1$
8	$\int_1^4 3\sqrt{x}\, dx =$	12	13	14	15
9	Solution of differential equation $\frac{dy}{dx} = -y$ is:	$y = ce^x$	$y = ce^{-x}$	$xy = c$	$y = cx$
10	$\int \sin x \cos x\, dx =$	$\sin x + c$	$\frac{\cos^2 x}{2} + c$	$\frac{\sin^3 x}{3} + c$	$\frac{\sin^2 x}{2} + c$
11	Inclination of a line $y = x$ is:	0°	30°	45°	60°
12	Distance of a line $y = 2$ from $(0, 0)$ is:	0	2	1	$\frac{1}{2}$
13	Equation $x^2 - xy = 0$ represents the number of straight lines:	2	1	3	4
14	$2x - y \geq 4$ is satisfied by:	$(2, 1)$	$(1, -2)$	$(0, 0)$	$(1, 1)$
15	Centre of circle $(x-2)^2 + y^2 = 16$ is:	$(2, -2)$	$(0, 2)$	$(-2, 2)$	$(2, 0)$
16	Directrix of parabola $x^2 = -16y$ is:	$y + 4 = 0$	$y - 4 = 0$	$y + 6 = 0$	$y - 16 = 0$
17	Eccentricity of circle is:	0	1	$\frac{1}{2}$	2
18	$\bar{a}$ and $\bar{b}$ are perpendicular of:	$\bar{a} \times \bar{b} = 0$	$\bar{a} \cdot \bar{b} = 0$	$\bar{a} \cdot \bar{b} = 1$	$\bar{b} \times \bar{a} = 2$
19	Projection of $\bar{v} = x\hat{i} + y\hat{j} + z\hat{k}$ along $\hat{i}$ is:	x	y	z	0
20	$\hat{i} \cdot \hat{k} \times \hat{j}$ is:	1	0		

INTERMEDIATE PART-II (12th Class) **2025 (1st-A)** **Roll No:**

MATHEMATICS PAPER-II GROUP-II

TIME ALLOWED: 2.30 Hours **SUBJECTIVE** **MAXIMUM MARKS: 80**

NOTE: Write same question number and its parts number on answer book, as given in the question paper.

SECTION-I

2. Attempt any eight parts. **8 × 2 = 16**

(i) Check whether the function $f(x)=\dfrac{x^3-x}{x^2+1}$ is even or odd.

(ii) If $f(x)=2x+1,\ g(x)=\dfrac{3}{x-1}$, find $(gof)(x)$

(iii) Evaluate $\lim\limits_{x\to\infty}\left(\dfrac{x}{1+x}\right)^x$

(iv) Show that $x=at^2,\ y=2at$ represent the equation of parabola $y^2=4ax$

(v) By definition, find the derivative of $y=2x^2+1$

(vi) Find $\dfrac{dy}{dx}$ when $x^2+y^2=4$

(vii) Find $\dfrac{dy}{dx}$ when $y=x\cos y$

(viii) Find the domain and range of $f(x)=\dfrac{x-1}{x-4}$

(ix) Find the critical values of the function $f(x)=3+3x-x^3$

(x) If $f(x)=\ell n(1+x)$, find $f''(x)$ at $x=2$

(xi) Find y_2 when $y=(2x+5)^{3/2}$

(xii) Find two positive integers whose sum is 30 and product is maximum.

3. Attempt any eight parts. **8 × 2 = 16**

(i) Find δy in $y=x^2-1$ when x changes from 3 to 3.02.

(ii) Evaluate $\int\dfrac{x}{x+2}dx,\ (x>-2)$

(iii) Evaluate $\int\dfrac{e^{2x}+e^x}{\ }dx$

(iv) Evaluate $\int \ell nx\,dx$

(v) Find the area between the x – axis and the curve $y=x^2+1$ from $x=1$ to $x=2$

(vi) Solve $x\dfrac{dy}{dx}=1+y$

(vii) Evaluate $\int e^x\left(\dfrac{1}{x}+\ell nx\right)dx$

(viii) Show that the points $A(-1,2),\ B(7,5),\ C(2,-6)$ are the vertices of a right triangle.

(ix) Find h such that $A(-1,h),\ B(3,2),\ C(7,3)$ are collinear.

(x) The coordinates of a point P are $(-6,9)$. The axes are translated through the point $O'(-3,2)$. Find the coordinates of P referred to the new axes.

(xi) Write down an equation of the line which cuts the X - axis at $(2,0)$ and Y – axis at $(0,-4)$

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

4. Attempt any nine parts. **9 × 2 = 18**

(i) Graph the solution set of $3y-4\le 0$ in xy – plane.

(ii) Define feasible region.

(iii) Find centre of circle $5x^2+5y^2+14x+12y-16=0$

(iv) Determine whether the point $P(-5,6)$ lies outside, on or inside the circle $x^2+y^2+4x-6y-12=0$

(v) Find vertex of parabola $y^2=-8(x-3)$

(vi) Find centre, foci of ellipse $9x^2+y^2=18$

(vii) Find centre, vertices of hyperbola $\dfrac{y^2}{16}-\dfrac{x^2}{9}=1$

(viii) Find a unit vector in the direction of vector $\underline{v}=\dfrac{1}{2}\underline{i}+\dfrac{\sqrt{3}}{2}\underline{j}$

(ix) If $\underline{u}=2\underline{i}+3\underline{j}-\underline{k},\ \underline{v}=4\underline{i}+6\underline{j}+2\underline{k}$ find $\underline{u}+2\underline{v}$

(x) Find projection of $\underline{b}$ along $\underline{a}$ when $\underline{a}=\underline{i}-\underline{k},\ \underline{b}=\underline{j}+\underline{k}$

(xi) Prove that $\underline{u}\times\underline{v}=-\underline{v}\times\underline{u}$

(xii) Find a vector whose magnitude is 2 and is parallel to $-\underline{i}+\underline{j}+\underline{k}$

(xiii) Find volume of the parallelepiped for which vectors are three edges. $\underline{u}=3\underline{i}+2\underline{k},\ \underline{v}=\underline{i}+2\underline{j}+\underline{k},\ \underline{w}=-\underline{j}+4\underline{k}$

CTION-II

NOTE: Attempt any three questions. **3 × 10 = 30**

5.(a) Find values of m and n if the function

$$f(x)=\begin{cases} mx & \text{if } x<3 \\ n & \text{if } x=3 \\ -2x+9 & \text{if } x>3 \end{cases}$$ is continuous at $x=3$

(b) Show that $\dfrac{dy}{dx}=\dfrac{y}{x}$ if $\dfrac{y}{x}=\tan^{-1}\dfrac{x}{y}$

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

(b) Evaluate $\int e^{-x}\sin 2x\,dx$

7.(a) Evaluate $\int_1^e x\,\ell nx\,dx$

(b) Graph the solution region of the following system of linear inequalities and find the corner points. $3x-2y\ge 6,\ x+3y\le 6,\ y\ge 0$

8.(a) Find an equation of the circle which passes through the points $A(5,10),\ B(6,9)$ and $C(-2,3)$

(b). Find the condition that the lines $y=m_1x+c_1;\ y=m_2x+c_2$ and $y=m_3x+c_3$, are concurrent.

9.(a) Find the focus, vertex and directrix of the parabola $x^2-4x-8y-4=0$

(b) Prove that the line segment joining the mid-points of two sides of a triangle is parallel to the third side and half as long.