Paper Code Number: 4193	**2024 (1st-A) INTERMEDIATE PART-II (12th Class)**	**Roll No:** MTN-1-24
MATHEMATICS PAPER-II GROUP-I		
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	Length of latus ractum of ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is:	$\frac{2a^2}{b}$	$\frac{a^2}{b}$	$\frac{b^2}{a}$	$\frac{2b^2}{a}$
2	Equation of tangent to circle $x^2+y^2=a^2$ at (x_1, y_1) is:	$xx_1+yy_1=a^2$	$xx_1-yy_1=a^2$	$xy_1+x_1y=a^2$	$xy_1-x_1y=a^2$
3	If α, β, γ are direction cosines of a vector then $\cos^2\alpha+\cos^2\beta+\cos^2\gamma=?$	3	1	2	0
4	For what value of 'α' vectors $5\hat{i}-\hat{j}+\hat{k}$ and $\alpha\hat{i}+3\hat{j}-3\hat{k}$ are parallel to each other:	-3	15	-15	3
5	If any two vectors of scalar triple product are equal then value is:	1	-1	2	0
6	$\underset{n\to\infty}{\ell im}\left(1+\frac{1}{n}\right)^{2n}=?$	e^{-1}	$e^{\frac{1}{2}}$	e^2	e^3
7	The function $f(x)=\frac{x^2+1}{x-1}$ is discontinuous at:	$x=2$	$x=0$	$x=-1$	$x=1$
8	Derivative of x^0 with respect to 'x' is:	0	x	1	c
9	$\frac{d}{dx}[fog(x)]=?$	$f'[g(x)]$	$f[g'(x)]$	$f'[g(x)]g'(x)$	$f[g(x)]g'(x)$
10	Geometrically $\frac{dy}{dx}$ means:	Tangent of slope	Slope of line	Slope of $x-$axis	Slope of tangent
11	$\underset{h\to 0}{\ell im}\frac{f(a+h)-f(a)}{h}=?$	$f'(a)$	$f'(x)$	$f'(a+h)$	$f(a)$
12	$\int\frac{f'(x)}{f(x)}dx=?$	$\ell n\lvert x\rvert+c$	$\ell n\lvert f(x)\rvert+c$	$\ell n\lvert f'(x)\rvert+c$	$f(x)$
13	$\int(ax+b)^n dx$ where $n\neq -1$ is:	$\frac{(ax+b)^{n+1}}{n+1}+c$	$\frac{(ax+b)^{n+1}}{a}+c$	$\frac{(ax+b)^{n+1}}{a(n+1)}+c$	$\frac{(ax+b)^{n+1}}{n}+c$
14	$\int 2^x dx=?$	$x2^{x-1}+c$	$2^x\ell n2+c$	$\frac{2^{x+1}}{x+1}+c$	$\frac{2^x}{\ell n2}+c$
15	When expression $\sqrt{a^2-x^2}$ involve in integration, we substitute:	$x=a\sin\theta$	$x=a\sec\theta$	$x=a\tan\theta$	$x=\sin\theta$
16	All points (x,y) with $x<0, y<0$ lies in quadrant:	I	II	III	IV
17	Slope of line passing through points $A(x_1, y_1)$ and $B(x_2, y_2)$ is:	$\frac{x_2-x_1}{y_2-y_1}$	$\frac{y_2+y_1}{x_2+x_1}$	$\frac{y_2-x_2}{y_1-x_1}$	$\frac{y_2-y_1}{x_2-x_1}$
18	Equation of vertical line through points $(3, -5)$ is:	$y=-5$	$y=5$	$x=3$	$x=-3$
19	Which of the following ordered pair does not satisfy $4x-3y<2$:	(1, 1)	(3, 0)	(−2, 1)	(0, 0)
20	Radius of circle $x^2+y^2=5$ is:	5	25	$\sqrt{5}$	$\frac{5}{2}$

INTERMEDIATE PART-II (12^{th} Class)	2024 (1^{st}-A)	Roll No: ________
MATHEMATICS PAPER-II GROUP-I		
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

MTN-1-24

2. Attempt any eight parts. $8 \times 2 = 16$

(i)	Discuss continuity of $g(x)=\frac{x^2-9}{x-3}$, $x \neq 3$ at $x=3$	(ii)	Determine whether $f(x)=\sin x+\cos x$ is even or odd function.
(iii)	Define Constant Function. Give one example also.	(iv)	Find $f^{-1}(x)$, when $f(x)=\frac{2x+1}{x-1}$ where $x>1$
(v)	Differentiate $\left(\sqrt{x}-\frac{1}{\sqrt{x}}\right)^2$ w.r.t 'x'.	(vi)	Find $\frac{dy}{dx}$, if $y^2+x^2-4x=5$
(vii)	Find derivative of $x^2-\frac{1}{x^2}$ w.r.t. x^4	(viii)	Prove that $\frac{d}{dx}[\cot^{-1} x]=-\frac{1}{1+x^2}$, $x \in R$
(ix)	Determine the values of x for which f defined as $f(x)=x^2+2x-3$ is increasing.	(x)	Define Taylor series expansion of function f at $x=a$
(xi)	Find y_2, if $y=\ln\left(\frac{2x+3}{3x+2}\right)$	(xii)	Find $\frac{dy}{dx}$, if $y=xe^{\sin x}$

3. Attempt any eight parts. $8 \times 2 = 16$

(i)	Find dy if $y=x^2+2x$ and x changes from 2 to 1.8.	(ii)	Evaluate $\int \frac{dx}{\sqrt{x}(\sqrt{x}+1)}$
(iii)	Evaluate $\int \cos 3x \ \sin 2x \ dx$	(iv)	Evaluate $\int \sec x \ dx$
(v)	Evaluate $\int x^2 \ln x \ dx$	(vi)	Evaluate $\int_0^{\pi/4} \sec x(\sec x+\tan x)\,dx$
(vii)	Solve the differential equation $\frac{dy}{dx}=\frac{y^2+1}{e^{-x}}$	(viii)	Show that the points $A(3,1)$, $B(-2,-3)$ and $C(2,2)$ are vertices of an isosceles triangle.
(ix)	Find slope and inclination of the line joining the points $(3,-2)$ and $(2,7)$.		
(x)	Find an equation of the line through $(-5,-3)$ and $(9,-1)$.		
(xi)	Convert the equation $15y-8x+3=0$ into normal form.		
(xii)	Find the angle from the line with slope $\frac{-7}{3}$ to the line with slope $\frac{5}{2}$.		

4. Attempt any nine parts. $9 \times 2 = 18$

(i)	What are Decision Variables?	(ii)	Draw the graph of inequality $2x+3y \leq 12$
(iii)	Find the centre and radius of the circle $x^2+y^2-6x+4y+13=0$		
(iv)	Check the position of the point $(5,6)$ with respect to the circle $x^2+y^2=81$		
(v)	Find the focus and directix of the parabola $x^2=4(y-1)$.		
(vi)	Write an equation of the ellipse with centre $(0,0)$ focus $(0,-3)$, vertex $(0,4)$.		
(vii)	Find foci and eccentricity of $x^2-y^2=9$		
(viii)	Find the length of the tangent drawn from the point $P(-5,10)$ to the circle $5x^2+5y^2+14x+12y-10=0$		
(ix)	Write the direction cosines of $\underline{v}=2\underline{i}+3\underline{j}+4\underline{k}$.		
(x)	Find a vector whose magnitude is 4 and parallel to $2\underline{i}-3\underline{j}+6\underline{k}$		
(xi)	Find $\underline{b}\times\underline{a}$ where $\underline{a}=3\underline{i}-2\underline{j}+\underline{k}$, $\underline{b}=\underline{i}+\underline{j}$		
(xii)	Find the value of $3\underline{i}\cdot\underline{k}\times\underline{i}$	(xiii)	If $\underline{a}+\underline{b}+\underline{c}=0$, then prove that $\underline{a}\times\underline{b}=\underline{b}\times\underline{c}$

SECTION-II

NOTE: Attempt any three questions. $3 \times 10 = 30$

5.(a)	Show that $\lim_{x\to 0}\frac{a^x-1}{x}=\log_e a$	(b)	If $x=a\cos^3\theta$, $y=b\sin^3\theta$, show that: $a\frac{dy}{dx}+b\tan\theta=0$
6.(a)	If $y=(\cos^{-1}x)^2$, prove that $(1-x^2)y_2-xy_1-2=0$	(b)	Show that $\int\sqrt{a^2-x^2}\,dx=\frac{a^2}{2}\sin^{-1}\frac{x}{a}+\frac{x}{2}\sqrt{a^2-x^2}+c$
7.(a)	Evaluate $\int_0^{\sqrt{3}}\frac{x^3+9x+1}{x^2+9}\,dx$	(b)	Maximize $f(x,y)=2x+5y$ subject to the constraints $2y-x\leq 8$, $x-y\leq 4$, $x\geq 0$, $y\geq 0$
8.(a)	Write an equation of the circle that passes through $A(-7,7)$, $B(5,-1)$, $C(10,0)$		
(b)	Prove that in any triangle ABC $a=b\cos C+c\cos B$		
9.(a)	Find the focus, vertex and directix of the parabola $x^2-4x-8y+4=0$		
	The midpoints of the sides of a triangle are $(1,-1)$, $(-4,-3)$ and $(-1,1)$. Find coordinates of the vertices of the triangle.		

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Paper Code Number: 4196	2024 (1^{st}-A) INTERMEDIATE PART-II (12^{th} Class)	Roll No: MTN-2-24

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	The equation of directix of the parabola $x^2=-16y$ is:	$y+4=0$	$y-4=0$	$x+4=0$	$x-4=0$
2	The eccentricity of $\frac{y^2}{4}-x^2=1$ is:	$\frac{\sqrt{5}}{2}$	$\frac{2}{\sqrt{5}}$	$\frac{-2}{\sqrt{5}}$	2
3	$3\hat{i}\cdot(2\hat{j}\times\hat{k})=?$	0	2	3	6
4	$Cos\,\theta$ equal to:	$\hat{a}\times\hat{b}$	$\hat{a}\cdot\hat{b}$	$\lvert\hat{a}\times\hat{b}\rvert$	$\underline{a}\times\underline{b}$
5	The length of the vector $2\hat{i}-2\hat{j}-\hat{k}$ is:	3	4	5	2
6	The function $x^2+xy+y^2=2$ of x and y is:	Constant	Even	Implicit	Explicit
7	If $f(x)=2x-8$, then $f^{-1}(x)=?$	$8-2x$	$8+2x$	$\frac{x-8}{2}$	$\frac{x+8}{2}$
8	$\frac{d}{dx}(3^x)=?$	$\frac{3^x}{\ell n3}$	$x\,\ell n3$	$3^x\,\ell n3$	$3^x\,\ell n x$
9	If $y=\cos^{-1}\frac{x}{a}$, then $\frac{dy}{dx}=?$	$\frac{-1}{\sqrt{a^2-x^2}}$	$\frac{-a}{\sqrt{x^2-a^2}}$	$\frac{a}{\sqrt{x^2-a^2}}$	$\frac{a}{\sqrt{a^2-x^2}}$
10	$\frac{d}{dx}(\cos x)=?$	$\sin x$	$-\sec x$	$\sec x$	$-\sin x$
11	If $y=\cos^{-1}\frac{x}{a}$, then $\cos y=?$	x	$\frac{x}{a}$	$\frac{y}{a}$	$\sin y$
12	$\int_0^{\pi}\sin x\,dx=?$	$\cos\pi$	0	1	2
13	$\int\tan x\,dx=?$	$\ln\lvert\sec x\rvert+c$	$\ln\lvert\operatorname{cosec} x\rvert+c$	$\ln\lvert\sin x\rvert+c$	$\ln\lvert\cot x\rvert+c$
14	$\int\frac{e^x}{e^x+5}dx=?$	$(e^x+5)+c$	$\ln(e^x+5)+c$	$e^{2x}+5$	$e^{2x}+7+c$
15	$\int-\operatorname{cosec}^2x\,dx=?$	$\cos x+c$	$\tan x+c$	$\operatorname{cosec} x+c$	$\cot x+c$
16	If α is the inclination of line ℓ, then $\frac{x-x_1}{\cos\alpha}=\frac{y-y_1}{\sin\alpha}=r(say)$ is called:	Point-slope form	Normal form	Symmetric form	Two-points form
17	Equation of line bisecting first and third quadrant is:	$x=0$	$y=0$	$y=-x$	$y=x$
18	The perpendicular distance of line $3x+4y-15=0$ from the origin is:	3	2	1	0
19	The graph of $2x\geq 4$ lies in:	Upper Half Plane	Lower Half Plane	Left Half Plane	Right Half Plane
20	Radius of circle $x^2+y^2=5$ is:	5	-5	$\sqrt{5}$	25

INTERMEDIATE PART-II (12th Class)	2024 (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

MTN-2-24

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

(i)	Define Implicit Function.	(ii)	Without finding the inverse, state the domain and range of f^{-1} $f(x)=\sqrt{x+2}$
(iii)	Prove that $\lim_{x\to 0}(1+x)^{\frac{1}{x}}=e$	(iv)	Evaluate $\lim_{x\to 0}\frac{\sin x^0}{x}$
(v)	Find by definition, derivative of $2x^2+1$ with respect to x	(vi)	Differentiate with respect to 'x' $\frac{x^2+1}{x^2-3}$
(vii)	Find $\frac{dy}{dx}$ if $y^2-xy-x^2+4=0$	(viii)	Find $\frac{dy}{dx}$ if $x=y\sin y$
(ix)	Find $f'(x)$ if $f(x)=x^3e^{\frac{1}{x}},\ x\neq 0$	(x)	Find y_2 if $y=\ln\left(\frac{2x+3}{3x+2}\right)$
(xi)	By Maclaurin's series, show that $\cos x=1-\frac{x^2}{2!}+\frac{x^4}{4!}-\frac{x^6}{6!}+$ ______	(xii)	Determine in which interval 'f' is increasing or decreasing for domain mentioned $f(x)=4-x^2,\quad x\in(-2,2)$

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

(i)	Find δy and dy in $y=x^2-1$ where x changes from 3 to 3.02.		
(ii)	Evaluate the integral $\int\frac{1}{x^2+4x+13}dx$	(iii)	Evaluate the integral $\int x\ln x\,dx$
(iv)	Evaluate $\int_{-2}^{0}\frac{1}{(2x-1)^2}dx$	(v)	Find the area bounded by the curve $y=x^3+3x^2$ and the $x-$axis.
(vi)	Solve the differential equation $\sin y\ \operatorname{cosec} x\frac{dy}{dx}=1$	(vii)	Find the general solution of the equation $\frac{dy}{dx}-x=xy^2$
(viii)	Show that the points $A(3,1)$, $B(-2,-3)$ and $C(2,2)$ are vertices of an isosceles triangle.		
(ix)	The $xy-$coordinate axes are rotated about the origin through the indicated angle and the new axes are OX and OY. Find the $xy-$coordinates of P with the given $XY-$coordinates $P(-5,3);\ \theta=30^o$		
(x)	Write down an equation of the straight line passing through (5, 1) and parallel to a line passing through the points $(0,-1)$, $(7,-15)$	(xi)	Find the point of intersection of the lines $5x+7y=35,\ 3x-7y=21$
(xii)	Find an equation of the line with $x-$intercept -3 and $y-$intercept 4.		

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

(i)	Define Feasible Solution.	(ii)	Graph the inequality $x+2y<6$
(iii)	Find the equation of the circle with centre at $(\sqrt{2},-3\sqrt{3})$ and radius $2\sqrt{2}$.		
(iv)	Find focus and directix of the parabola $y^2=-8(x-3)$		
(v)	Find length of tangent from the point $(-5,10)$ to the circle $5x^2+5y^2+14x+12y-10=0$		
(vi)	Find the centre and the foci of ellipse $9x^2+y^2=18$	(vii)	Write equation of hyperbola with foci $(\pm5,0)$ and vertex (3, 0).
(viii)	Define Conic Section.	(ix)	Find the vector from the point A to the origin where $\overrightarrow{AB}=4\underline{i}-2\underline{j}$ and B is the point $(-2,5)$.
(x)	If $\left|\alpha\underline{i}+(\alpha+1)\underline{j}+2\underline{k}\right|=3$. Find the value of α.		
(xi)	Show that the vectors $3\underline{i}-2\underline{j}+\underline{k}$, $\underline{i}-3\underline{j}+5\underline{k}$ and $2\underline{i}+\underline{j}-4\underline{k}$ form a right angle.		
(xii)	If $\underline{a}+\underline{b}+\underline{c}=0$, then prove that $\underline{a}\times\underline{b}=\underline{b}\times\underline{c}$		
(xiii)	A force $\underline{F}=2\underline{i}+\underline{j}-3\underline{k}$ acting at a point $A(1,-2,1)$. Find the moment of $\underline{F}$ about the point $B(2,0,-2)$		

SECTION-II

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

5.(a)	If $f(x)=\begin{cases}\frac{\sqrt{2x+5}-\sqrt{x+7}}{x-2}, & x\neq 2\\ k, & x=2\end{cases}$ Find value of 'k' so that 'f' is continuous at $x=3$.	(b)	Show that $\frac{dy}{dx}=\frac{y}{x}$ if $\frac{y}{x}=\tan^{-1}\frac{x}{y}$
6.(a)	If $y=e^x\sin x$, show that $\frac{d^2y}{dx^2}-2\frac{dy}{dx}+2y=0$	(b)	Evaluate $\int\sqrt{3-4x^2}\,dx$
7.(a)	Evaluate $\int_0^{\sqrt{3}}\frac{x^3+9x+1}{x^2+9}dx$	(b)	Graph the feasible region of the following system of linear inequalities and find the corner points. $2x+3y\le 18,\quad 2x+y\le 10,\quad x+4y\le 12,\quad x\ge 0,\ y\ge 0$
8.(a)	Find volume of the tetrahedron with vertices $A(2,1,8)$, $B(3,2,9)$, $C(2,1,4)$ and $D(3,3,10)$		
(b)	Write equations of two tangents from (2, 3) to the circle $x^2+y^2=9$		
9.(a)	Show that the equation $9x^2-18x+4y^2+8y-23=0$ represents an ellipse. Find its elements.		
(b)	Find an equation of medians of the triangle whose vertices are $A(-3,2)$, $B(5,4)$ and $C(3,-8)$		

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