Paper Code Number: 4193	2024 (1^{st}-A) INTERMEDIATE PART-II (12^{th} Class)	Roll No: MTN-I-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 rectum 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	$\lim_{n\to\infty}\left(1+\frac{1}{n}\right)^{2n}=?$	e^{-1}	$\frac{1}{e^2}$	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	[illegible]	1	c
9	$\frac{d}{dx}[fog(x)]=?$	$f'[g(x)]$	$g'[g(x)]$	$f'[g(x)]g'(x)$	$f[g(x)]g'(x)$
10	Geometrically $\frac{dy}{dx}$ means	Tangent of [illegible] slope	Slope of line	Slope of $x-$axis	Slope of tangent
11	$\lim_{h\to 0}\frac{f(a+h)-f(a)}{h}=?$	$f'(a)$	$f'(x)$	$f'(a+h)$	$f(a)$
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 (12th Class)	2024 (1st-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 × 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 × 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 × 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 × 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.		