Answer Sheet No. **MATHEMATICS 22/01** Roll No.

PART – II (OBJECTIVE PART) (★)

(INTERMEDIATE)

Sign. Dy. Supdnt. Fictitious Roll No. (For Office Use) Sign. Candidate

MATHEMATICS 22/01 (★)

(PART –II) (INTERMEDIATE) Marks : 20

(OBJECTIVE PART) Time : 30 Minutes

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Note:- Write your Roll No. in space provided. Over writing, cutting, using of lead pencil will result in loss of marks. All questions are to be attempted.

1- Each question has four possible answers, Tick (✓) the correct answer. (20)

1	$x = a\cos\theta$, $y = a\sin\theta$ are parametric equations of a;							
	A	Circle	B	Parabola	C	Ellipse	D	Hyperbola
2	$\lim_{x\to a} = \frac{x^n - a^n}{x - a} =$							
	A	na^n	B	na^{n+1}	C	na^{n-1}	D	$(n+1)a^{n-1}$
3	If $f(x) = \tan^{-1} x$, then $f'(x) =$							
	A	$\frac{-1}{1-x^2}$	B	$\frac{1}{1-x^2}$	C	$\frac{-1}{1+x^2}$	D	$\frac{1}{1+x^2}$
4	If $y = \ln(\sin x)$, then $\frac{dy}{dx} =$							
	A	$\frac{1}{\sin x}$	B	$\tan x$	C	$\cot x$	D	$\sec x$
5	If $f'(c) = 0$, then $f(x)$ has relative maxima at $x = c$ if;							
	A	$f''(c) = 0$	B	$f''(c) < 0$	C	$f''(c) > 0$	D	$f''(c) \neq 0$
6	$\frac{1}{2}\frac{d}{dx}(\tan^{-1} x - \cot^{-1} x) =$							
	A	$\frac{1}{1+x^2}$	B	$\frac{1}{1-x^2}$	C	$\frac{-1}{1+x^2}$	D	$\frac{-1}{1-x^2}$
7	$\int a^x dx =$							
	A	$a^x + c$	B	$a^x . \ln a + c$	C	$\frac{1}{\ln a} . a^x + c$	D	$\frac{\ln a}{a^x} + c$
8	$\int e^{\tan x} . \sec^2 x \, dx =$							
	A	$\tan x + c$	B	$e^{\sec^2 x} + c$	C	$e^{\tan x} . \tan x + c$	D	$e^{\tan x} + c$
9	$\int e^{-x}[-\sin x + \cos x]dx =$							
	A	$e^{-x} \sin x + c$	B	$e^{-x} \cos x + c$	C	$e^{-x} \tan x + c$	D	$e^{-x} \cot x + c$
10	The solution of the differential equation $\frac{dy}{dx} = \sec^2 x$, is;							
	A	$y = \cot x + c$	B	$y = \ln x + c$	C	$y = \cos x + c$	D	$y = \tan x + c$

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11	Slope of the line parallel to $3x-4y+5=0$, is;							
	A	$\frac{4}{3}$	B	$\frac{3}{4}$	C	$\frac{3}{5}$	D	$\frac{5}{3}$
12	The distance of the point P(4,-6) form x-axis is;							
	A	4	B	-4	C	6	D	-6
13	The lines represented by $ax^2+2hxy+by^2=0$, are real and distinct if;							
	A	$h^2-ab<0$	B	$h^2-ab=0$	C	$h^2-ab\neq 0$	D	$h^2-ab>0$
14	Slope of horizontal line is;							
	A	Zero	B	∞	C	1	D	-1
15	$x=4$ is the solution of the inequality;							
	A	$-2x+3>0$	B	$x+3>0$	C	$x-3<0$	D	$x+3<0$
16	The radius of the circle $x^2+y^2+2gx+2fy+c=0$, is;							
	A	g^2+f^2+c	B	g^2+f^2-c	C	$\sqrt{g^2+f^2+c}$	D	$\sqrt{g^2+f^2-c}$
17	Length of latus-rectum of the parabola $(y-2)^2=-4(x-7)$, is;							
	A	4	B	-4	C	8	D	-8
18	Vertices of the ellipse $\frac{x^2}{2}+\frac{y^2}{9}=1$, are;							
	A	$(\pm 3,0)$	B	$(0,\pm 3)$	C	$(0,\pm\sqrt{2})$	D	$(\pm\sqrt{2},0)$
19	Projection of $\underline{a}=\underline{i}-\underline{k}$ along $\underline{b}=\underline{j}+\underline{k}$ is;							
	A	$-\frac{1}{\sqrt{2}}$	B	$\frac{1}{\sqrt{2}}$	C	$\frac{1}{2}$	D	$-\frac{1}{2}$
20	The vectors $\underline{u}, \underline{v}$ and $\underline{w}$ are coplanar if;							
	A	$\underline{u}.\underline{v}\times\underline{w}=0$	B	$\underline{u}.\underline{v}\times\underline{w}=1$	C	$\underline{u}.\underline{v}\times\underline{w}=2$	D	$\underline{u}.\underline{v}\times\underline{w}=3$

(The End)

MATHEMATICS **22/01**

PAPER : PART – II **INTERMEDIATE** **Marks : 80**

(SUBJECTIVE PART) **Time : 2:30 Hours**

Note:- Attempt any Twenty Five (25) short questions in all selecting eight from Q. 2 and Q. 3 each and nine from Q. 4.

SECTION – I

ATK-22

2- Write short answers of any eight parts. **(2 x 8 = 16)**

i	Find $\frac{f(a+h)-f(a)}{h}$ and simplify where $f(x)=6x-9$	*ii*	If $f(x)=\frac{1}{\sqrt{x-1}}$, $g(x)=\sqrt{x^2+1}$ Find (a) $fog(x)$ (b) $gof(x)$
iii	Find $\lim_{x\to+\infty}\frac{2-3x}{\sqrt{3+4x^2}}$	*iv*	Find $\lim_{x\to 0}\frac{\sin ax}{\sin bx}$
v	Find $\lim_{x\to\infty}\left(\frac{x}{1+x}\right)^x$	*vi*	Find the derivative of $\frac{1}{\sqrt{x}}$ w.r.t 'x' by definition.
vii	If $y=\frac{2x-1}{\sqrt{x^2+1}}$ find $\frac{dy}{dx}$	*viii*	Find $\frac{dy}{dx}$ if $y^2+x^2-4x=5$
ix	If $y=x\cos y$, find $\frac{dy}{dx}$	*x*	Find $f'(x)$, if $f(x)=Sin^{-1}\sqrt{1-x^2}$
xi	Find $\frac{dy}{dx}$, if $y=(\ln\tanh x)$	*xii*	If $y=\sqrt{x}+\frac{1}{\sqrt{x}}$, find y_2

3- Write short answers of any eight parts. **(2 x 8 = 16)**

i	Solve the differential equation $\sin y \ \operatorname{cosec} x\frac{dy}{dx}=1$	*ii*	Find area bounded by the curve $y=\sqrt{3-x}$ and above x-axis form $x=-1$ to $x=2$
iii	Evaluate $\int_1^2(x^2+1)dx$	*iv*	Evaluate $\int x^2\ln x dx$
v	Evaluate $\int\cos\left(\sqrt{x}-\frac{x}{2}\right)\times\left(\frac{1}{\sqrt{x}}-1\right)dx$	*vi*	Evaluate $\int\frac{\sqrt{y}(y+1)}{y}dy$
vii	Find δy and dy if $y=\sqrt{x}$ when x changes from 4 to 4.41	*viii*	Evaluate $\int\frac{dx}{\sqrt{x+1}-\sqrt{x}}$
ix	Find an equation of a line passing through $(-4,7)$ and parallel to the line $2x-7y+4=0$	*x*	Express the lines $3x+4y-7=0$, $2x-5y+8=0$, $x+y-3=0$ in matrix form and check whether the lines are concurrent.
xi	Find the two lines represented by $6x^2-19xy+15y^2=0$	*xii*	Find area of the region bounded by the triangle whose vertices are $(a,b+c)$, $(a,b-c)$ and $(-a,c)$

4- Write short answers of any nine parts. **(2 x 9 = 18)**

i	Define objective function for linear programming problems.	*ii*	Graph the solution set of $3x+7y\geq 21$ linear inequality in xy-plane.
iii	Find the centre and radius of the circle with given equation $x^2+y^2-6x+4y+13=0$	*iv*	Determine whether the point $(-5,6)$ lies outside, on or inside the circle $x^2+y^2+4x-6y-12=0$
v	Find the length of the tangent drawn from the point $(-5,4)$ to the circle $5x^2+5y^2-10x+15y-131=0$	*vi*	Write an equation of the parabola with focus $(2,5)$ and directrix $y=1$
vii	Find foci of the ellipse $x^2+4y^2=16$	*viii*	Find slope of the tangent to the curve $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ at $(a\cos\theta, b\sin\theta)$
ix	If $\underline{u}=2\underline{i}-7\underline{j}$, $\underline{v}=\underline{i}-6\underline{j}$ and $\underline{w}=-\underline{i}+5$ find $\frac{1}{2}\underline{u}+\frac{1}{2}\underline{v}+\frac{1}{2}\underline{w}$	*x*	Find a unit vector in the direction of $\underline{v}=\underline{i}+2\underline{j}-\underline{k}$
xi	Find a real number α so that the vectors $\underline{u}=\alpha\underline{i}+2\alpha\underline{j}-\underline{k}$ and $\underline{v}=\underline{i}+\alpha\underline{j}+3\underline{k}$ are perpendicular.	*xii*	Compute the cross product $\underline{a}\times\underline{b}$ and $\underline{b}\times\underline{a}$ when $\underline{a}=3\underline{i}-2\underline{j}+\underline{k}$, $\underline{b}=\underline{i}+\underline{j}$
xiii	Find cosine of the angle θ between $\underline{u}=\underline{i}-3\underline{j}+4\underline{k}$, $\underline{v}=4\underline{i}-\underline{j}+3\underline{k}$		

SECTION – II

Note:- Attempt any three questions from this section.
All questions carry equal Marks. AJK-22 **(10x3=30)**

5	*(a)*	*If* $f(x)=\begin{cases}\dfrac{\sqrt{2x+5}-\sqrt{x+7}}{x-2} & , x\neq 2\\ k & , x=2\end{cases}$ *Find value of* k *so that* f *is continuous at* $x=2$	(05)
	(b)	*Differentiate ab-initio w.r.t.* 'x' $\sin\sqrt{x}$	(05)
6	(a)	Evaluate $\int\frac{2x}{x^6-1}dx$	(05)
	(b)	*The points* $A(-1,2)$, $B(6,3)$ *and* $C(2,-4)$ *are vertices of a triangle. Show that the line joining the midpoint D of AB and the midpoint E of AC is parallel to BC and* $DE=\frac{1}{2}BC$	(05)
7	(a)	Solve the differential equation; $y-x\frac{dy}{dx}=3\left(1+x\frac{dy}{dx}\right)$	(05)
	(b)	Graph the solution region of the system of linear inequalities and find the corner point. $3x+7y\leq 21$ $2x-y\leq -3$ $y\geq 0$	(05)
8	(a)	Find the interior angles of the triangle whose vertices are A(2,-5), B(-4,-3), C(-1,5)	(05)
	(b)	Show that the circles $x^2+y^2+2x-2y-7=0$ and $x^2+y^2-6x+4y+9=0$ touch externally.	(05)
9	(a)	Find an equation of the ellipse with foci $(\pm\sqrt{5},0)$ and passing through the point $\left(\frac{3}{2},\sqrt{3}\right)$	(05)
	(b)	Prove that the points whose position vectors are $A(-6\underline{i}+3\underline{j}+2\underline{k})$, $B(3\underline{i}-2\underline{j}+4\underline{k}), C(5\underline{i}+7\underline{j}+3\underline{k}), D(-13\underline{i}+17\underline{j}-\underline{k})$ are coplanar.	(05)

(The End)