Answer Sheet No. _____ **MATHEMATICS (OBJECTIVE PART)** Roll No. _____

PART – II **21/01** (☼☼)

(INTERMEDIATE) (Smart Syllabus)

AJK-21

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

MATHEMATICS **21/01** **(Smart Syllabus)**

(PART –II) **(INTERMEDIATE)** **Marks : 20**

(OBJECTIVE PART) (☼☼) **Time : 30 Minutes**

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	$\frac{d}{dx}(\sin\sqrt{x}) =$						
	A $\cos\sqrt{x}$	B $-\cos\sqrt{x}$	C $\frac{-1}{2\sqrt{x}}\cos\sqrt{x}$	D $\frac{1}{2\sqrt{x}}\cos\sqrt{x}$			
2	$\frac{d}{dx}(\sinh^{-1}x) =$						
	A $\frac{1}{\sqrt{1+x^2}}$	B $\frac{-1}{\sqrt{1+x^2}}$	C $\frac{1}{\sqrt{1-x^2}}$	D $\frac{-1}{\sqrt{1-x^2}}$			
3	$\int(\sin^2 x+\cos^2 x)dx =$						
	A $\sin x+\cos x+c$	B $\cos 2x+\sin 2x+c$	C $x+c$	D $\frac{1}{2}x^2+c$			
4	$\int(\tan^{-1}x.\frac{1}{1+x^2})dx =$						
	A $\frac{1}{2}(\tan^{-1}x)^2+c$	B $\ln(\tan^{-1}x)+c$	C $2(\tan^{-1}x)^2+c$	D $(\tan^{-1}x)^2+c$			
5	$\int(\frac{1}{x\sqrt{x^2-a^2}})dx =$						
	A $\frac{1}{a}\tan^{-1}\left(\frac{x}{a}\right)+c$	B $\frac{1}{a}Sec^{-1}\left(\frac{x}{a}\right)+c$	C $\tan^{-1}\left(\frac{x}{a}\right)+c$	D $Sec^{-1}\left(\frac{x}{a}\right)+c$			
6	$\int_0^1 \frac{1}{1+x^2}dx =$						
	A $\frac{\pi}{2}$	B $\frac{\pi}{6}$	C $\frac{\pi}{3}$	D $\frac{\pi}{4}$			
7	The function $f(x)=\frac{3x}{x^2+1}$ is _____ function.						
	A Even	B Odd	C Linear	D Quadratic			
8	If $g(x)=\frac{1}{x^2}, x\neq 0$ then $gog(x) =$						
	A 1	B x^2	C x^4	D $\frac{1}{x^4}$			
9	The derivative of $\frac{x^3+2x^2}{x^3}$ equals;						
	A $\frac{2}{x^2}$	B $\frac{-2}{x^2}$	C $\frac{1}{2x^2}$	D $\frac{-1}{2x^2}$			
10	$\frac{d}{dx}(x-\frac{1}{x}) =$						
	A $1-\frac{1}{x}$	B $1+\frac{1}{x}$	C $1+\frac{1}{x^2}$	D $1-\frac{1}{x^2}$			

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11	The circle $x^2+y^2+2gx+2fy+c=0$, passes through the origin if;						
	A	$c=0$	B	$c=-1$	C	$c=1$	D	$c=2$
12	Focus of the parabola $x^2=-16y$ is;						
	A	$(0,4)$	B	$(0,-4)$	C	$(4,0)$	D	$(-4,0)$
13	Foci of the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$, are						
	A	$(\pm a,0)$	B	$(0,\pm a)$	C	$(\pm ae,0)$	D	$(0,\pm ae)$
14	The unit vector in the direction of $\underline{v}=2\underline{i}-\underline{j}$ is						
	A	$\frac{2\underline{i}-\underline{j}}{3}$	B	$\frac{2\underline{i}-\underline{j}}{\sqrt{3}}$	C	$\frac{2\underline{i}-\underline{j}}{5}$	D	$\frac{2\underline{i}-\underline{j}}{\sqrt{5}}$
15	If the vectors $2\underline{i}+4\underline{j}-7\underline{k}$ and $2\underline{i}+6\underline{j}+x\underline{k}$ are perpendicular, then $x=$						
	A	8	B	4	C	2	D	1
16	$2\underline{i}\times 2\underline{j}.\underline{k}=$						
	A	2	B	4	C	8	D	1
17	The distance of the point (-1,3) from x-axis is;						
	A	1	B	-1	C	3	D	-3
18	Slope of the straight line $ax+by+c=0$, is;						
	A	$\frac{a}{b}$	B	$-\frac{a}{b}$	C	$\frac{b}{a}$	D	$-\frac{b}{a}$
19	The lines l_1 and l_2 with slopes m_1 and m_2 respectively are perpendicular if;						
	A	$m_1=m_2$	B	$m_1m_2=1$	C	$m_1m_2=-1$	D	$m_1+m_2=0$
20	The point (1,2) lies in the solution of the inequality;						
	A	$2x+y>5$	B	$2x+y<3$	C	$2x+y>6$	D	$x+3y>5$

(The End)

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(SUBJECTIVE PART)

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NOTE:- **Attempt any TWENTY FIVE (25) short questions in all selecting eight from Q. 2 and Q. 3 each and nine from Q. 4.** **(25 x 2 = 50)**

SECTION – I

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

i	Find the domain and range of $f(x)=\sqrt{x^2-9}$	ii	Determine whether $f(x)=Sin\,x+Cos\,x$ is even or odd.
iii	For the functions $f(x)=\frac{1}{\sqrt{x-1}}$ and $g(x)=\frac{1}{x^2}, x\neq 0$ find $fog(x)$ and $gof(x)$	iv	Evaluate $\lim_{n\to\infty}\left(1+\frac{3}{n}\right)^{2n}$
v	Differentiate $y=\frac{1}{\sqrt{x}}$ by definitions.	vi	Differentiate $\frac{x^2-1}{x^2-3}$ w.r.t x
vii	$y=(3x^2-2x+7)^6$ find $\frac{dy}{dx}$	viii	$\tan y(1+\tan x)=(1-\tan x)$ show that $\frac{dy}{dx}=-1$
ix	Differentiate $(\ln x)^x$ w.r.t x	x	Find y_2 if $y=(2x+5)^{\frac{3}{2}}$
xi	Find the extreme values of the function $f(x)=5x^2-6x+2$	xii	Find $\frac{dy}{dx}$ if $y=e^{-2x}\sin 2x$

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

i	Find dy if $y=x^2-1$ and x changes from 3 to 3.02	ii	Evaluate the integral $\int\frac{(1-\sqrt{x})^2}{\sqrt{x}}dx,(x>0)$
iii	Evaluate $\int\frac{1}{x\ln x}dx$	iv	Evaluate the integral $\int e^x\left(\frac{1}{x}+\ln x\right)dx$
v	Evaluate $\int\frac{3x+1}{x^2-x-6}dx$	vi	Evaluate $\int_1^2(x^2+1)dx$
vii	Find the area between the x-axis and the curve $y=x^2+1$ from $x=1$ to $x=2$	viii	Solve the differential equation $\frac{dy}{dx}=-y$
ix	Show that the point $A(0,2)$, $B(\sqrt{3},-1)$ and $C(0,-2)$ are vertices of a right triangle.	x	Two points P and O' are given in xy-coordinate system. Find the XY-coordinates of P refered to the translated axis. $P(-6,-8)$; $O'(-4,-6)$
xi	Find equation of line through $(-5,-3)$ and $(9,-1)$	xii	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.

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

i	Graph the solution set of given linear inequality in $xy-plane$, $5x-4y \le 20$	ii	Find an equation of the circle with ends of a diameter at (-3,2) and (5,-6)
iii	Write an equation of the parabola with given elements. Focus (-3,1); directrix $x-2y-3=0$	iv	Find an equation of directrix of given parabola; $x^2=4(y-1)$
v	Find eccentricity of $\frac{y^2}{16}-\frac{x^2}{9}=1$	vi	Find Foci and vertices of hyperbola. $9x^2-12x-y^2-2y+2=0$
vii	Find a unit vector in the direction of the vector $\underline{v}=2\underline{i}+6\underline{j}$	viii	Find a vector whose magnitude is 2 and is parallel to $-\underline{i}+\underline{j}+\underline{k}$
ix	Find the direction cosines for the vector: $\underline{v}=3\underline{i}-\underline{j}+2\underline{k}$	x	Find the cosine of the angle θ between $\underline{u}$ and $\underline{v}$: $\underline{u}=[2,-3,1], \underline{v}=[2,4,1]$
xi	Compute $\underline{a}\times\underline{b}$, check your answer by showing that $\underline{a}$ is perpendicular to $\underline{a}\times\underline{b}$. $\underline{a}=-4\underline{i}+\underline{j}-2\underline{k}$, $\underline{b}=2\underline{i}+\underline{j}+\underline{k}$	xii	Find volume of the parallelepiped determined by; $\underline{u}=\underline{i}+2\underline{j}-\underline{k}; \underline{v}=\underline{i}-2\underline{j}+3\underline{k}, \underline{w}=\underline{i}-7\underline{j}-4\underline{k}$
xiii	A force $\underline{F}=4\underline{i}-3\underline{k}$, passes through the point A(2,-2,5). Find the moment of $\underline{F}$ about the point $B(1,-3,1)$		

SECTION – II

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

5	(a)	Evaluate $\lim_{\theta\to 0}\frac{\tan\theta-\sin\theta}{\sin^3\theta}$	(05)
	(b)	If $x=a\cos^3\theta$, $y=b\sin^3\theta$ then show that $a\frac{dy}{dx}+b\tan\theta=0$	(05)
6	(a)	Show that $\int\sqrt{a^2-x^2}\,dx=\frac{a^2}{2}\sin^{-1}\frac{x}{a}+\frac{x}{2}\sqrt{a^2-x^2}+c$	(05)
	(b)	Find h such that the points A(h,1),B(2,7)and C(-6,-7) are vertices of a right triangle with right angle at the vertex A.	(05)
7	(a)	Evaluate $\int_0^{\frac{\pi}{4}}\frac{1}{1+\sin x}dx$	(05)
	(b)	Graph the feasible region of system of linear inequalities. $2x-3y\le 6$, $2x+3y\le 12$, $x\ge 0$, $y\ge 0$. Also find corner points.	(05)
8	(a)	Find the volume of Tetrahedron with vertices. (0,1,2)(3,2,1)(1,2,1) and (5,5,6)	(05)
	(b)	Write an equation of circle passing through the points A(5,6), B(-3,2), C(3,-4)	(05)
9	(a)	Find the point on the curve $y=x^2-1$ that is closest to the point (3,-1)	(05)
	(b)	Write an equation of the parabola with given elements. Axis parallel to y-axis, the points (0,3),(3,4) and (4,11) lie on the graph.	(05)

(The End)

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