Faisalabad Board Group-I *(First Annual Examination 2025)*

Objective Paper Code 8197	Intermediate Part Second MATHEMATICS (Objective) Time: 30 Minutes	Roll No. ____________ Group - I Marks: 20

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill the relevant circle in front of that question number on computerized answer sheet. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Attempt as many question as given in objective types question paper and leave other circle blank.

Q1.

S.#	Questions	A	B	C	D
1	Intercepts form of the line $8x+6y-1=0$ is:	$\frac{x}{8}+\frac{y}{6}=1$	$\frac{x}{1/8}+\frac{y}{1/6}=1$	$\frac{x}{6}+\frac{y}{8}=1$	$\frac{x}{16}+\frac{y}{14}=1$
2	Homogeneous equation of second degree $ax^2+2hxy+by^2=0$ where a, b, h are not all zero, represents two real and coincident lines if:	$h^2=ab$	$h^2>ab$	$h^2<ab$	$ah^2=b$
3	Slope of y-axis or of any line parallel to y-axis is:	π	$\frac{\pi}{2}$	1	Undefined
4	The graph of inequality $y\le b$ is:	Upper half plane	Lower half plane	Left half plane	Right half plane
5	If the equation $ax^2+by^2+2hxy+2gx+2fy+c=0$ represents a circle, then:	$h=0$	$a=b$	$h=0$ and $a=b$	$h=0,\ f=g$
6	The center of the circle $ax^2+ay^2=bx+cy+c$ is:	$\left(\frac{b}{a},\frac{c}{a}\right)$	$\left(\frac{b}{2a},\frac{c}{2a}\right)$	$\left(-\frac{b}{2a},-\frac{c}{2a}\right)$	$\left(\frac{a}{2b},\frac{c}{2a}\right)$
7	If the eccentricity of a conic $ax^2+ay^2=bx+cy+c$ is:	A circle	A parabola	An ellipse	A hyperbola
8	If $\underline{a}$ and $\underline{b}$ are two vectors then $a-b=b-a$ iff:	$\lvert\underline{a}\rvert=\lvert\underline{b}\rvert$	$\underline{a}=\underline{b}$	$\underline{a}\perp\underline{b}$	$\underline{a}\parallel\underline{b}$
9	The moment of a force $\overline{F}$ acting at point P about O is:	$\overline{F}\times\overline{CP}$	$\overline{CP}\times\overline{F}$	$\overline{CP}\cdot\overline{F}$	$\overline{OP}\times\overline{F}$
10	For what value of m, the vectors $4i+2j-3k$ and $m\underline{i}-\underline{j}+\sqrt{3\underline{k}}$ have the same magnitude:	5	-5	±5	0
11	$\lim\limits_{n\to\infty}\left(1+\frac{1}{n}\right)^{2n}=$:	e^2	e^{-1}	e^{-2}	e
12	If $f(x)=x^3-2x+4x-1$ then $f(-2)=0$	25	10	1	-25
13	$\frac{d}{dx}(\tan 3x)=$:	$3\sec^2x$	$3\sec^2 3x$	$\sec^2 3x$	$\sec^2x$
14	$f(x)=-3x^2$ has maximum value at:	$x=0$	$x=1$	$x=2$	$x=3$
15	The derivative of $y=\log_e(1-x^2)$ is:	$\frac{1}{1-x^2}$	$\frac{1}{x^2-1}$	$\frac{-2x}{1-x^2}$	$\frac{-2x}{x^2-1}$
16	If $y=\operatorname{cosec} x$ than $\frac{dy}{dx}$ is:	cosec^2x	$\operatorname{cosec} x\cot x$	$\cot x$	$-\operatorname{cosec} x\cot x$
17	$\int\frac{1}{ax+b}dx=$:	$\ell n\lvert ax+b\rvert+c$	$\frac{1}{a}\ell n\lvert ax+b\rvert+c$	$\frac{1}{b}\ell n\lvert ax+b\rvert+c$	$\frac{1}{x}\ell n\lvert ax+b\rvert+c$
18	$\int\sin(ax+b)=$:	$\frac{\cos(ax+b)}{ax+b}+c$	$-\frac{\cos(ax+b)}{b}+c$	$-\frac{\cos(ax+b)}{a}+c$	$\frac{\cos(ax+b)}{a+b}+c$
19	$\int\frac{e^{\tan^{-1}x}}{1+x^2}dx=$:	$e^{\tan x}+c$	$\frac{1}{2}e^{\tan^{-1}x}+c$	$xe^{\tan^{-1}x}+c$	$e^{\tan^{-1}x}+c$
20	$\int\frac{1}{1-\sin^2x}dx=$:	$\tan x+c$	$\sec x+c$	$\cos x+c$	$\sec^2x+c$

Intermediate Part Second

MATHEMATICS (Subjective) Group - I

Time: 02:30 Hours Marks: 80

Roll No. ________

SECTION - I

Q2. Attempt any EIGHT parts: 16

(i) Show that parametric equations $x = a\sec\theta$, $y = b\tan\theta$ represents the equation of hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$
(ii) Find $f^{-1}(x)$ if $f(x)=\frac{2x+1}{x-1}, x>1$ (iii) Evaluate: $\lim_{x\to 0}\frac{1-\cos 2x}{x^2}$ (iv) If $f(x)=\begin{cases}x+2, x\le -1\\ c+2, x>-1\end{cases}$ find c so that $\lim_{x\to -1} f(x)$ exists. (v) Express $\lim_{x\to+\infty}\left(1+\frac{3}{n}\right)^{2n}$ in terms of e. (vi) If $y=\frac{1}{x^2}$, then find $\frac{dy}{dx}$ at $x=-1$ by ab-initio method. (vii) Differentiate $\frac{2x^3-3x^2+5}{x^2+1}$ with repsect to x. (viii) Find $\frac{dy}{dx}$ if $y=x^n$ where $n=\frac{p}{q}, q\neq 0$ (ix) If $y=\sqrt{\tan x+\sqrt{\tan x+\sqrt{\tan x+........\infty}}}$ show that $(2y-1)\frac{dy}{dx}=\sec^2 x$. (x) Find $\frac{dy}{dx}$ if $y=\tanh^{-1}(\sin x), \frac{\pi}{2}<x<\frac{\pi}{2}$
(xi) Find y_2 if $x^3 - y^3 = a^3$. (xii) Determine the intervals in which f(x) is increasing or decreasing if $f(x)=\cos x;\ x\in\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$

Q3. Attempt any EIGHT parts: 16

(i) Evaluate $\int \tan^2 x\,dx$ (ii) Integrate $\int \frac{1}{(1+x^2)\tan^{-1}x}dx$ (iii) Find the integral $\int \sec^4 x\,dx$ (iv) Evaluate $\int e^{-x}(\cos x-\sin x)dx$
(v) Find the definite integral $\int_1^2 \frac{x}{x^2+2}dx$ (vi) Evaluate $\int \frac{x}{\sqrt{4+x^2}}dx$ (vii) Find the area bounded by the curve y=x3+3x2 and x–axis from x= – 3 to x=0 (viii) Find the distance between the points A (–5,3) and B (7,–2). (ix) Find the coordinates of the point that divides the join of A(–6, 3) and B (5, 2) in the ratio 2:3 externally. (x) Show that the triangle with vertices A(1,1), B (4,5) and C(12,1) is a right triangle. (xi) Write an equation of horizontal line through (7,9). (xii) Find the distance between the parallel line $3x-4y+3=0$, $3x-4y+7=0$

Q4. Attempt any NINE parts: 18

(i) Define feasible region. (ii) Graph the solution set of $3x+7y>21$ in xy-plane. (iii) Find the radius of the circle: $5x^2+5y^2+24x+36y+10=0$ (iv) Find the length of the tangent from the point P (–5, 10) to $5x^2+5y^2+14x+12y-10=0$ (v) Calculate the focus and directrix of the parabola $x^2=-16y$ (vi) Find foci and vertices of the ellipse $9x^2+y^2=18$ (vii) Find the eccentricity and vertices of the hyperbola $x^2-y^2=9$ (viii) Find a unit vector in the direction of the vector $\underline{v}=2\underline{i}+6\underline{j}$ (ix) Find α, so that $|\alpha\underline{i}+(\alpha+1)\underline{j}+2\underline{k}|=3$ (x) Calculate the projection of $\underline{i}-\underline{k}$ along $\underline{j}+\underline{k}$ (xi) Prove that in any triangle ABC. $C = a\cos B+b\cos A$ (xii) Compute $a\times b$ if $a=2\underline{i}+\underline{j}-\underline{k}$ and $b=\underline{i}-\underline{j}+\underline{k}$ (xiii) Find the constant a such that the vectors $\underline{i}-2\underline{j}-3\underline{k}$, $\underline{i}-\underline{j}+\underline{k}$ and $3\underline{i}-a\underline{j}+5\underline{k}$ are coplanar.

SECTION - II

Note: Attempt any THREE questions. Each question carries 10 marks.

Q5. (a) Prove that $\lim_{x\to 0}\frac{a^x-1}{x}=\log_e a$ 5

(b) Find $\frac{dy}{dx}$ if $x=a(\cos t+\sin t)$, $y=a(\sin t-t\cos t)$ 5

Q6. (a) If $y=(\cos^{-1}x)^2$ prove that $(1-x^2)y_2-xy_1-2=0$ (b) Evaluate $\int \operatorname{cosec}^3 x\,dx$ 5,5

Q7. (a) Solve the differential equation $\frac{dy}{dt}=2x$, given that x = 4 when t = 0. 5

(b) Graph the feasible region of the system of linear inequalities and find the corner points. 5
$3x+2y\geq 6,\ x+y\leq 4,\ x\geq 0,\ y\geq 0$

Q8. (a) Show that the circles $x^2+y^2+2x-8=0$, $x^2+y^2-6x+6y-46=0$ 5

(b) Find the equation of line through the point (2,–9) and the intersection of the lines $2x+5y-8=0$ and $3x-4y-=0$. 5

Q9. (a) Find the center, foci, vertices and eccentricity of the ellipse $25x^2+4y^2-250x-16y+541=0$ 5

(b) Prove that, by using vectors $\sin(\alpha-\beta)=\sin\alpha\cos\beta-\cos\alpha\sin\beta$. 5