MATHEMATICS Part-II	Paper Code	Roll No. of the Student						
Time: 20 Minutes Marks: 20	● ② ③	Serial No. Of the Answer Book_____						
Multiple Choice Questions 01 Mark for each								

SECTION-A

Note:

1) Attempting all MCQs is compulsory. This paper along with the OMR sheet must be returned to the superintendent after due time.
2) Fill the circle Ⓐ/Ⓑ/Ⓒ/Ⓓ, which one is correct with blue or black ball point, in this sheet as well as in separate OMR Sheet like ●
3) If more than one circle in the OMR sheet is filled then no credit will be given to such answer.

I.i. If $f(x)=e^x$, then $f^{-1}(x)=$_____.

Ⓐ e^x Ⓑ e^{-x} Ⓒ $\frac{1}{e}$ Ⓓ $\ln x$

ii. The graph of $ax+by+c=0$ is _____.

Ⓐ Straight line Ⓑ Parabola Ⓒ Ellipse Ⓓ Hyperbola

iii. $F(x)=\frac{2x+1}{x(x+3)}$ is discontinous at x= _____.

Ⓐ (0,2) Ⓑ (3,2) Ⓒ (-3,1) Ⓓ (-3,0)

iv. $\frac{1}{1+x^2}$ is the derivate of _____.

Ⓐ $\text{Sin}^{-1}x$ Ⓑ $\text{Cos}^{-1}x$ Ⓒ $\text{Tan}^{-1}x$ Ⓓ $\text{Cot}^{-1}x$

v. $\frac{d}{dx}\left(\text{Sin}\frac{a}{x}\right)=$ _____.

Ⓐ $\text{Cos}\frac{a}{x}$ Ⓑ $-\text{Sin}\frac{a}{x}$ Ⓒ $\frac{1}{a}\text{Cos}\frac{a}{x}$ Ⓓ $\frac{-a}{x^2}\text{Cos}\frac{a}{x}$

vi. $\lim_{x\to\infty}\left(1+\frac{1}{x}\right)^x=$ _____.

Ⓐ 0 Ⓑ 1 Ⓒ e Ⓓ ∞

vii. $\int\frac{dx}{1+x^2}=$ _____.

Ⓐ $-\text{Tan}^{-1}x+c$ Ⓑ $-\text{Cot}^{-1}x+c$ Ⓒ $\text{Tan}^{-1}x+c$ Ⓓ $\text{Cot}^{-1}x+c$

viii. $\int\frac{1}{\sqrt{x}}dx=$ _____.

Ⓐ $\sqrt{x}+c$ Ⓑ $\frac{1}{2\sqrt{x}}+C$ Ⓒ $2\sqrt{x}+c$ Ⓓ $\frac{1}{\sqrt{x}}+c$

ix. If $\tan\Theta=\frac{m1-m2}{1+m1m2}$ and if $\frac{m1-m2}{1+m1m2}$ is negative then the angle is _____.

Ⓐ Acute Ⓑ Obtuse Ⓒ Right Ⓓ Zero

x. $\int_{-1}^{1}x^3dx=$_____.

Ⓐ -1 Ⓑ 0 Ⓒ 3 Ⓓ 4

xi. $\int_a^b F(x)\,dx=$ _____.

Ⓐ $\int_{-b}^{-a}F(x)dx$ Ⓑ $\int_a^b F(x)dx$ Ⓒ $\int_{-b}^{-a}F(x)dx$ Ⓓ $\int_b^a F(x)dx$

xii. The distance between the points (1,2) & (2,1) is _____.

Ⓐ 2 Ⓑ $2\sqrt{2}$ Ⓒ $\sqrt{2}$ Ⓓ $\sqrt{5}$

xiii. Angle bisectors of a triangle are _____.

Ⓐ Parallel Ⓑ Perpendicular Ⓒ Collinear Ⓓ Concurrent

xiv. The two straight lines of homogenous equation $ax^2+2hxy+by^2=0$ are real & coincident if _____.

Ⓐ $h^2-ab>0$ Ⓑ $h^2-ab<0$ Ⓒ $h^2-ab=0$ Ⓓ $h^2+ab=0$

xv. The centre of circle $(x+2)^2+(y-1)^2=9$ is _____.

Ⓐ (2,1) Ⓑ (2,-1) Ⓒ (1,2) Ⓓ (-2,1)

xvi. The asymptotes of the hyperbola $\frac{x^2}{4}-\frac{y^2}{9}=1$ are _____.

Ⓐ $X=\pm\frac{3}{2}y$ Ⓑ $Y=\pm\frac{3}{2}X$ Ⓒ $X=\pm\frac{2}{3}y$ Ⓓ $Y=\pm\frac{2}{3}X$

xvii. The line $y=mx+c$ should touch the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ if c=_____.

Ⓐ $\pm\sqrt{a^2m^2-b^2}$ Ⓑ $\pm a\sqrt{1+m^2}$ Ⓒ $\pm\sqrt{a^2+b^2}$ Ⓓ $\pm\sqrt{a^2m^2+b^2}$

xviii. The conic is called ellipse if _____.

Ⓐ e=0 Ⓑ e<1 Ⓒ e>1 Ⓓ e=1

xix. The degree of differential equation $\frac{dy}{dx}=xy^2+xy$ _____.

Ⓐ 0 Ⓑ 1 Ⓒ 2 Ⓓ 3

xx. If $F(x,y)=x+y+xy$, then Fx= _____.

Ⓐ 1+y Ⓑ x Ⓒ 1+x Ⓓ y

MATHEMATICS Part-II

Note: Time allowed for section B and C is 2 hours and 40 minutes.

SECTION "B" — Marks: 50

II. Attempt any Ten Parts out of the following. Each Part carries equal marks.

i. If $f(x) = 4x + 1$ and $g(x) = 2x^2 + 5x$. Find $g[f(x)]$ and $f[g(x)]$.

ii. Evaluate $\lim_{x \to 1} \left(\frac{x^2+3x+2}{x^2+x+2}\right)^2$.

iii. Differentiate $y=x^2-6x+5$ by first principle rule.

iv. Find $\frac{dy}{dx}$, if $y=\sin x \cos x$.

v. Find $\frac{dy}{dx}$, if $y=\log[\text{Sin}(\log x)]$.

vi. Evaluate $\int \frac{\text{Cos}^2 x}{\text{Cosec } x} dx$ by substitution.

vii. Use integration by parts to evaluate $\int \text{Tan}^{-1} x dx$.

viii. Evaluate $\int_0^1 (x-3)e^x dx$.

ix. Show that the points A(0,-2), B(3,1), C(0,4) & D(-3,1) are the vertices of a square ABCD.

x. Find the point of intersection of the line $3x-4y+20=0$ & the circle $x^2+y^2=25$.

xi. Find the tangent equation to parabola $x^2=y$ which makes an angle of 45° with the x-axis.

xii. Find the normal equation at a point (0,2) to ellipse $\frac{x^2}{9}+\frac{y^2}{4}=1$.

xiii. For what value of C, the line $y=-x+c$ will touch the hyperbola $\frac{x^2}{16}-\frac{y^2}{9}=1$.

SECTION "C" — Marks: 30

Note: Attempt any Three questions of the following. Each question carries equal Marks.

III. a) Find x,so that $\log_b x+\log_b (x-4)=\log_b 21$.

b) Solve $\int \frac{dx}{\sin^2 x}=-\cot x+C$

IV. a) If $V=2i-j+5K$ & $W=i+2j-3K$ are vector function, evaluate $\frac{d}{dt}(v+tw)$.

b) Find the equation of line, if the x-intercept & y-intercept of the line are x:(4,0), y:(0,6).

V. a) Find the point of intersection P(x,y) of the pair of lines $2x+4y-10=0$, $5x-3y+1=0$.

b) Find the equation of the tangents to the circle $x^2+y^2=2$, which makes an angle of 45° with the x-axis.

VI. a) Solve initial value problems $2\frac{dy}{dx}=4xe^{-x}$, $y(0)=42$.

b) Verify Euler's theorem for the function $F(x,y)=\frac{x^{\frac{1}{4}}+y^{\frac{1}{4}}}{x^{\frac{1}{3}}+y^{\frac{1}{3}}}$.