

MATHEMATICS Part-II Time: 20 Minutes Marks: 20 Multiple Choice Questions 01 Mark for each	Paper Code ● ② ③	Roll No. of the Student Serial No. Of the Answer Book
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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 (A)(B)(C)(D), 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 $f^{-1}(x)=$ _____.
- (A) e^x (B) e^{-x} (C) $\frac{1}{e}$ (D) $\ln x$
- ii. The graph of $ax+by+c=0$ is _____.
- (A) Straight line (B) Parabola (C) Ellipse (D) Hyperbola
- iii. $F(x)=\frac{2x+1}{x(x+3)}$ is discontinuous at $x=$ _____.
- (A) (0,2) (B) (3,2) (C) (-3,1) (D) (-3,0)
- iv. $\frac{1}{1+x^2}$ is the derivate of _____.
- (A) $\sin^{-1}x$ (B) $\cos^{-1}x$ (C) $\tan^{-1}x$ (D) $\cot^{-1}x$
- v. $\frac{d}{dx} \left(\sin \frac{a}{x} \right) =$ _____.
- (A) $\cos \frac{a}{x}$ (B) $-\sin \frac{a}{x}$ (C) $\frac{1}{a} \cos \frac{a}{x}$ (D) $\frac{-a}{x^2} \cos \frac{a}{x}$
- vi. $\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x} \right)^x =$ _____.
- (A) 0 (B) 1 (C) e (D) ∞
- vii. $\int \frac{dx}{1+x^2} =$ _____.
- (A) $-\tan^{-1}x+c$ (B) $-\cot^{-1}x+c$ (C) $\tan^{-1}x+c$ (D) $\cot^{-1}x+c$
- viii. $\int \frac{1}{\sqrt{x}} dx =$ _____.
- (A) $\sqrt{x}+c$ (B) $\frac{1}{2\sqrt{x}}+c$ (C) $2\sqrt{x}+c$ (D) $\frac{1}{\sqrt{x}}+c$
- ix. If $\tan \Theta = \frac{m_1 m_2}{1+m_1 m_2}$ and if $\frac{m_1 m_2}{1+m_1 m_2}$ is negative then the angle is _____.
- (A) Acute (B) Obtuse (C) Right (D) Zero
- x. $\int_1^1 x^3 dx =$ _____.
- (A) -1 (B) 0 (C) 3 (D) 4
- xi. $\int_a^b F(x) dx =$ _____.
- (A) $\int_b^a F(x) dx$ (B) $-\int_a^b F(x) dx$ (C) $\int_b^a F(x) dx$ (D) $-\int_b^a F(x) dx$
- xii. The distance between the points (1,2) & (2,1) is _____.
- (A) 2 (B) $2\sqrt{2}$ (C) $\sqrt{2}$ (D) $\sqrt{5}$
- xiii. Angle bisectors of a triangle are _____.
- (A) Parallel (B) Perpendicular (C) Collinear (D) Concurrent
- xiv. The two straight lines of homogenous equation $ax^2+2hxy+by^2=0$ are real & coincident if _____.
- (A) $h^2-ab>0$ (B) $h^2-ab<0$ (C) $h^2-ab=0$ (D) $h^2+ab=0$
- xv. The centre of circle $(x+2)^2+(y-1)^2=9$ is _____.
- (A) (2,1) (B) (2,-1) (C) (1,2) (D) (-2,1)
- xvi. The asymptotes of the hyperbola $\frac{x^2}{4} - \frac{y^2}{9} = 1$ are _____.
- (A) $X = \pm \frac{3}{2}y$ (B) $Y = \pm \frac{3}{2}X$ (C) $X = \pm \frac{2}{3}y$ (D) $Y = \pm \frac{2}{3}X$
- xvii. The line $y=mx+c$ should touch the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ if $c=$ _____.
- (A) $\pm \sqrt{a^2 m^2 - b^2}$ (B) $\pm a \sqrt{1+m^2}$ (C) $\pm \sqrt{a^2 + b^2}$ (D) $\pm \sqrt{a^2 m^2 + b^2}$
- xviii. The conic is called ellipse if _____.
- (A) $e=0$ (B) $e<1$ (C) $e>1$ (D) $e=1$
- xix. The degree of differential equation $\frac{dy}{dx} = xy^2 + xy$ _____.
- (A) 0 (B) 1 (C) 2 (D) 3
- xx. If $F(x,y)=x+y+xy$, then $F_x=$ _____.
- (A) $1+y$ (B) x (C) $1+x$ (D) y

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 $\lim_{x \rightarrow 1} \left(\frac{x^2 + 3x + 2}{x^2 + x + 2} \right)^2$.
- 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 $y = \log[\sin(\log x)]$.
- vi. Evaluate $\int \frac{\cos^2 x}{\operatorname{Cosec} x} dx$ by substitution.
- vii. Use integration by parts to evaluate $\int \tan^{-1} x dx$.
- 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 $F(x,y) = \frac{x^{\frac{1}{3}} + y^{\frac{1}{3}}}{x^{\frac{1}{3}} + y^{\frac{1}{3}}}$.