Sig. of Supdt.....

KT-XII-1901
Mathematics (Part – II)
Fresh/Reappear

Roll No.....

Flc. No.....

Flc. No.....

Time allowed: 3 Hrs **Mathematics (Part – II)** **Code-C** **Marks: 100**

Fresh / Reappear

Note: There are three sections of the paper, A, B & C. Attempt Section – A on the same paper and return it to the Superintendant within the given time. Mobile phone etc. are not allowed in the examination hall.

Time: 20 Mins **Section "A"** **Marks: 20**

Q.1 Write the correct option i.e. A, B, C or D in the empty box provided opposite to each part. No marks will be awarded for cutting, erasing or over writing.

i. The function $f(x) = \frac{x^2-4}{x+2}$ is not defined for ..... [C]

A. 2 B. 4 C. -2 D. 0

ii. $\lim_{x\to 0}(1+x)^{1/x}$ = ... [C]

A. 0 B. 1 C. e D. None of these

iii. If $y = x^6$ then y^v = ... [D]

A. 0 B. 5 C. 5! D. 120

iv. $\frac{d}{dx}(x+\sqrt{x})$ =..... [D]

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

v. $\frac{d}{dx}(Sechx)$ = ... [C]

A. Sechx Tanhx B. $\tan^2 hx$ C. –Sechx tanhx D. $-\tan^2 hx$

vi. $\int e^{3x}dx$ = ... [C]

A. e^{3x} B. $3e^{3x}$ C. $\frac{e^{3x}}{3}$ D. e^{3x}/n^3

vii. $\int_{-1}^{1} dx$ = ... [C]

A. 1 B. 0 C. 2 D. -2

viii. If a point (x, y) is in 3rd quadrant then ..... [B]

A. xy = 0 B. xy < 0 C. xy > 0 D. None of these

ix. A line ax + by + c = 0 will be parallel to X–axis if ..... [A]

A. b = 0 B. a = o C. c = 0 D. None of these

x. If f(x) = 2x + 3 then f^{-1} f(x) = ... [D]

A. 2 B. 0 C. $\frac{x+3}{2}$ D. x

xi. $\frac{d}{dx}$ ln (lnx) = ... [D]

A. lnx B. xlnx C. $\frac{x}{\ln x}$ D. $\frac{1}{x\ln x}$

xii. If the angle subtended by the minor arc is $\theta/2$ then its major arc angle is ..... [A]

A. θ B. 2 θ C. $\theta/4$ D. None of these

xiii. A function f(x) is said to be concave up in an interval [a, b] if ..... [B]

A. $f'(x) < 0$ B. $f''(x) > 0$ C. $f''(x) < 0$ D. $f'(x) > 0$

xiv. If $f'(x)$ changes sign from +ve to -ve then f(x) is ..... [C]

A. Maximum B. Minimum C. Inflection D. None of these

xv. The distance between X–axis and Y–axis is ..... [D]

A. 1 B. ∞ C. 0 D. None of these

xvi. If the circle touching Y–axis, then r = ... [N]

A. $|-f|$ B. $|-g|$ C. $|-g| = |-f|$ D. 0

xvii. The mid point of transverse axis is ..... [C]

A. Focus B. Vertex C. Centre D. Origin

xviii. If a function z = f(x, y) is homogenous of degree n then $x\frac{\partial z}{\partial x} + y\frac{\partial z}{\partial y}$ = ... [B]

A. z^n B. nz C. n D. None of these

xix. In Simpson's Rule Δx ..... if [a, b] = [-1, 2], n = 2 [B]

A. 3/4 B. 3/2 C. 1 D. 3/8

xx. The degree of the equation of Parabola is ..... [B]

A. 1 B. 2 C. 3 D. o

Time: 2:40 Hours 916 KT-XII-1901

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Section "B" **Marks: 50**

Q.2 Attempt any TEN parts. All parts carry equal marks.

i. Find the inverse of f(x). If $f(x) = \frac{x+4}{2}$

ii. Evaluate the limit $\lim_{x \to 0} \frac{\tan x}{x}$

iii. Differentiate by using first principle $f(x) = 5x + 6$

iv. Use implicit differentiation to find $dy/dx\ x^2 + y^2 = 25$

v. Find $\frac{dy}{dx}$ If $y = 5^{(x^2-x)}$

vi. Find equation of normal to the curve $y = 2\ln x$ at $x=1$.

vii. Evaluate the indefinite integral $\int \frac{x^3+1}{x^3} dx$

viii. Evaluate the definite integral $\int_1^2 (2x^{-2} - 3) dx$

ix. Find the area of the triangular region $P_1\ P_2\ P_3$ whose vertices are P_1 (4,-5), P_2 (5, -6) and P_3 (3, 1).

x. Find equations of the tangents drawn from the point (6, 4) to the circle $x^2 + y^2 = 16$.

xi. If $F(t) = i + e^t j + t^2 k$ and $G(t) = 3t^2 i + e^{-t} j - 2t k$ are the two vector functions and h(t) is any scalar function then find $\frac{d}{dt}(F.G)$

xii. Under what condition the tangent line $4x-y-4=0$ intersects the parabola $x^2 = y$

xiii. Translate to the parallel axes through the point (-1, 2), the conic $x^2+y^2+2x-4y+1=0$

Section "C" **Marks: 30**

Note: Attempt any THREE questions. All questions carry equal marks.

Q.3 a. Find the angle from the line $7x + 3y - 9 = 0$ to the line $5x-2y + 2 = 0$

b. Evaluate the definite integral $\int_0^{\pi/4} \sec^2 \theta\, d\theta$

Q.4 a. Determine the slope of the tangent line to the curve $3x^2 - 7y^2 + 14y = 27$ at the point P(-3, 0).

b. Evaluate the indefinite integral by using substitution $\int 4\sec^2 4x\, dx$

Q.5 a. Find the condition that the line $x + y + n = 0$ touches the circle $x^2 + y^2 = 9$.

b. Evaluate the integral $\int \frac{dx}{x^2 - 4}$

Q.6 a. Find the points of intersection of the line $2x - y - 2 = 0$ and the ellipse $4x^2 + 9y^2 = 36$

b. Find the general solution of the differential equation $x\frac{dy}{dx} = x + y$