Paper Code: ①

ESKPXII-XXVI (I)

MATHEMATICS PART-II

Time Allowed: 3 Hrs **Marks: 100**

Note: There are **Three Sections** in this paper i.e. A, B and C. Attempt Section-A and return it to the Superintendent within the given time. No marks will be awarded for **Cutting, Erasing and Overwriting.**

Mobile Phone is strictly prohibited in Examination Hall.

Time: 20 Minutes **SECTION "A"** **Marks: 20**

Q.1. Choose the correct option and shade one of (A, B, C, D) in the given **Bubble Answer Sheet.**

i. The statement "$x \to \infty$", best describes:

Ⓐ x is equal to the largest possible number. Ⓑ x increases without bound. Ⓒ x is a very large constant. Ⓓ x approaches a specific, very high limit on the y-axis.

ii. $The\ correct\ value\ of\ the\ limit, \lim_{x\to 1} \frac{\sqrt{x}-1}{x-1}\ is:$

Ⓐ $\frac{1}{2}$ Ⓑ 0 Ⓒ $\frac{1}{\sqrt{2}}$ Ⓓ Does not exist

iii. The average rate of change of the linear function $f(x) = x^2 - 2x\ as\ x$ increases from -1 to 1 is:

Ⓐ -1 Ⓑ 1 Ⓒ -2 Ⓓ 2

iv. $Derivative\ of\ y = cotx\ is:$

Ⓐ $-sec^2x$ Ⓑ $-cosec^2x$ Ⓒ $cosec^2x$ Ⓓ sec^2x

v. $The\ 2nd\ derivative\ of\ f(x) = 5x^6.$

Ⓐ $25x^4$ Ⓑ $30x^5$ Ⓒ $100x^3$ Ⓓ $150x^4$

vi. $If\ f(t) = \ln(t-5)i + \frac{1}{t-10}j + \sqrt{t}k,$ is a vector function, the positive value of t excluded from the domain is:

Ⓐ 10 Ⓑ 5 Ⓒ 1 Ⓓ 0

vii. $The\ most\ general\ antiderivative\ of\ f(x) = \frac{1}{sin^2x}\ is:$

Ⓐ $tanx + c$ Ⓑ $cosx + c$ Ⓒ $-cotx + c$ Ⓓ $cos^2x + c$

viii. $If\ F(x)\ is\ an\ antiderivative\ of\ f(x) = 4x^3, and\ F(0) = -2, the\ specific\ equation\ for\ F(x)\ is:$

Ⓐ $F(x) = x^4 + 2$ Ⓑ $F(x) = x^4 - 2$ Ⓒ $F(x) = 4x^4 - 2$ Ⓓ $F(x) = x^4$

ix. $The\ correct\ value\ of\ \int \left(\frac{1}{k} + a\right) dx\ is:$

Ⓐ $(\ln k + a)x + C$ Ⓑ $(\ln k + a) + C$ Ⓒ $\left(\frac{1}{k} + a\right) + C$ Ⓓ $\left(\frac{1}{k^2} + a\right) + C$

x. $To\ evaluate\ \int \frac{\ln x}{x} dx, the\ correct\ substitution\ is:$

Ⓐ $u = \frac{\ln x}{x}$ Ⓑ $u = \ln x$ Ⓒ $u = \frac{1}{x}$ Ⓓ $u = x$

xi. The correct equation for a straight line that is parallel to the y-axis and passes through the point (4,-1) is:

Ⓐ $y = 4$ Ⓑ $y = -1$ Ⓒ $x = 4$ Ⓓ $x = -1$

xii. The point (0,0) lies relative to the line $y = 2x + 3$ as:

Ⓐ Above the line Ⓑ Below the line Ⓒ On the line Ⓓ It is the y-intercept

xiii. The center of the circle having equation $(x-4)^2 + (y+1)^2 = 16$ is:

Ⓐ (4,-1) Ⓑ (-4,1) Ⓒ (4,1) Ⓓ (-4,-1)

xiv. The length of the Latus Rectum for the parabola $y^2 = 20x\ is:$

Ⓐ 5 Ⓑ 10 Ⓒ 20 Ⓓ 40

xv. The coordinates of the foci for the ellipse $\frac{x^2}{169} + \frac{y^2}{144} = 1$ are:

Ⓐ $(\pm 13, 0)$ Ⓑ $(0, \pm 5)$ Ⓒ $(\pm 12, 0)$ Ⓓ $(\pm 5, 0)$

xvi. The order of the differential equation $\sqrt{\frac{d^4y}{dx^4}} + 3x\left(\frac{d^2y}{dx^2}\right)^3 = e^x$ is:

Ⓐ 4 Ⓑ 3 Ⓒ 2 Ⓓ 1

xvii. The ODE $y\frac{d^2y}{dx^2} + x\left(\frac{dy}{dx}\right)^2 + 6y = 1\ is:$

Ⓐ Linear, First Order Ⓑ Non-linear, First Order Ⓒ Linear, Second Order Ⓓ Non-linear, Second Order

xviii. $If\ f(x,y) = \frac{x^2}{y} + 3xy^4, then\ f_x\ should\ be:$

Ⓐ $\frac{2x}{y} + 3y^4$ Ⓑ $\frac{2x}{y} + 12xy$ Ⓒ $-\frac{2x}{y^2} + 12xy$ Ⓓ $-\frac{2x}{y^2} + 3y^4$

xix. $If\ f(x) = x^5 - 10$ and the initial interval is [1, 2]. The interval for second iteration of the Bisection Method is:

Ⓐ [1.25, 1.75] Ⓑ [1, 1.5] Ⓒ [1.5, 2] Ⓓ [1.25, 2]

xx. For the Newton-Raphson Method to converge to a root, the initial guess x_o should be:

Ⓐ Far from the root Ⓑ Sufficiently close to the root Ⓒ Exactly equal to zero Ⓓ Always a positive number