Mathematics Paper – XII (01) (17)

Roll No Name

1۔ ہر سوال کے سامنے چار دائرے دیے گئے ہیں، صرف صحیح جواب والا دائرہ بھر دیں۔
2۔ دائروں کو شیڈ (بھرنے) کے لئے نیلے یا کالے رنگ کا پین استعمال کریں۔
3۔ جواب میں ایک سے زائد دائرے بھرنے سے جواب غلط تصور ہو گا۔

Time Allowed: 20 Minutes SECTION – A Marks : 20

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|---|---|---|---|---|
| If $f(x,y) = x^3y + xy^2$ then $\frac{\partial f}{\partial y}$ = ..... | ○ $3x^2y + y^2$ | ○ $3x^2y + 2xy$ | ● $x^3 + 2xy$ | ○ $x^3 + 2y$ |
| To evaluate $\int \frac{dx}{\sqrt{x^2 - a^2}}$, we need to substitute..... | ○ $x = a\cos\theta$ | ○ $x = a\sin\theta$ | ● $x = a\sec\theta$ | ○ $x = a\tan\theta$ |
| If the position vector of a particle is $R(t) = ti + t^2j + 2tk$, then its speed at $t = 1$ is... | ○ 6 | ○ $\sqrt{6}$ | ● 3 | ○ None of these |
| A line $y = mx + c$ is tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ if $c^2$ =... | ○ $a^2m^2 + b^2$ | ● $a^2m^2 - b^2$ | ○ $a^2(m^2 + b^2)$ | ○ $a^2(m^2 - b^2)$ |
| $f(x)$ is continuous over $[a, b]$ and $\int_a^b f(x) = F(b) - F(a)$ is the statement of fundamental theorem of ..... | ● Calculus | ○ Integral calculus | ○ Algebra | ○ None of these |
| If $f(x)$ is continuous then $\sqrt[n]{f(x)}$ with $n$ is greater than one and ..... | ● Any positive integer | ○ Even +ve integer | ○ Odd +ve integer | ○ None of these |
| The differential equation $\frac{dy}{dx} = \frac{y - x}{y + x}$ is.... | ○ Linear | ○ Non linear | ● Homogeneous | ○ Non homogeneous |
| $f(x, y) = \frac{1}{x + y}\sin\left(\frac{2xy}{x^2 + y^2}\right)$ is homogeneous function of degree... | ○ 2 | ● 1 | ○ Zero | ○ Undefined |
| The process that produces $f'(x)$ from the function $f(x)$ is called.... | ○ Derivative | ● Differentiation | ○ Differential | ○ Approximation |
| If F and G are two vector functions then which one of the given is different? | ○ F + G | ○ F – G | ○ F x G | ● F.G |
| Equation of normal to a circle $x^2 + y^2 = a^2$ at $(x_1, y_1)$ is..... | ○ $xy_1 - yx_1 = 0$ | ○ $x_1y + y_1x = 0$ | ○ $xx_1 - yy_1 = 0$ | ○ $yy_1 + xx_1 = 0$ |
| $\frac{d}{dx}(\sec h^{-1}x)$ = ..... | ● $\frac{1}{x\sqrt{x^2 - 1}}$ | ○ $\frac{-1}{x\sqrt{x^2 - 1}}$ | ○ $\frac{-1}{x\sqrt{1 - x^2}}$ | ○ $\frac{1}{x\sqrt{1 - x^2}}$ |
| Newton-Raphson method needs for its success approximation only..... | ● One point | ○ Two points | ○ More than two points | ○ No point |
| The value of $f(x) = \frac{1}{1 + x}$ equals its Taylor series only when x belongs | ○ $(-1, 1]$ | ○ $(-1, 1)$ | ○ $[-1, 1)$ | ● None of these |
| The centroid of the triangle A (3, – 5), B (– 7, 4), C (10, – 2) is... | ○ (2, 1) | ○ (–2, 1) | ○ (–2, –1) | ● (2, –1) |
| The equation $x^2 + y^2 + 2gx + 2fy + c = 0$ s.t $g^2 + f^2 - c = 0$ represents ..... | ○ Circle | ● Point | ○ Conic | ○ Joint equation of lines |
| The focus of the parabola $x^2 + y = 0$ is | ○ $(0, \frac{1}{4})$ | ○ $(\frac{1}{4}, 0)$ | ● $(0, -\frac{1}{4})$ | ○ $(-\frac{1}{4}, 0)$ |
| The graph of the function $f(x)$ in the neighborhood of $P(C, f(c))$ s.t $f'(c) = 0$ and $f''(c) > 0$ is ..... | ● Concave up | ○ Concave down | ○ Maximum | ○ None of these |
| $\lim_{x \to 0} \frac{\lvert x \rvert}{x}$ = ..... | ○ 1 | ○ – 1 | ○ 0 | ● Not possible |
| The altitudes of a triangle are..... | ○ Parallel | ○ Perpendicular | ● Concurrent | ○ None of these |

# MATHEMATICS (New)

Inter Part-II

(Fresh/Reappear)

**Note:** Time allowed for Section – B and Section – C is 2 Hours and 40 minutes.

## Section – B

**Marks:** 50

Q-II Answer any TEN parts. Each part carries FIVE marks.

1. Prove that $\lim_{x \to a}\left(\frac{x^n - a^n}{x - a}\right) = na^{n-1}$.

2. Find $f'(x)$ such that $f(x) = \left(\frac{3x - 8}{x + 9}\right)^2$.

3. Find $y''$ when $e^x + x = e^y + y$.

4. If F (t) and G (t) are differentiable vector functions of t, then prove that $(F.G)'(t) = (F'.G)(t) + (F.G')(t)$

5. Evaluate $\int(\tan 3x + \sec 3x)dx$

6. Determine the approximate area of the region bounded by $f(x) = x^2 + 1$ where $a = 0, b = 2$ for $n = 8$.

7. Check whether the lines $x - y - 2 = 0$, $2x - y - 5 = 0$, $11x - 5y - 28 = 0$ are concurrent or not. Find point of concurrency if exists.

8. Find the equation of circle which contains the points $(1, -2)$, $(4, 3)$ and has its centre on $3x + 4y - 7 = 0$.

9. Indicate the vertex, focus, end points of focal chord and the axis of symmetry of $(y - 3)^2 = x$.

10. Find the equation of ellipse with vertices $(-5, 0)$ and $(5, 0)$ and eccentricity $e = 3/5$.

11. Reduce the differential equation $\frac{dy}{dx} = \frac{y}{x} + \frac{x^2}{y^2}$ in variable separable form and then solve.

12. Find $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$ of $f(x, y) = \sqrt{3x^2 + y^4}$.

13. Find iterate $x_3$ of Newton – Raphson iterative method for $f(x) = \sin(x)$ with $x_0 = 1$.

## Section – C

**Marks:** 30

**Note : Attempt any THREE questions. Each question carries equal marks.**

Q-III (a) Find the first four terms in the Taylor series expansion of $f(x) = x + e^x$ about $x = 1$.

(b) Evaluate $\int\left(\frac{3x + 5}{x^2 + 2x - 3}\right)dx$.

Q-IV (a) Find the equation of the straight line passing through the intersection of $x - 2y = a$, $x + 3y = 2a$ and is parallel to the line $3x + 4y = 0$.

(b) Find the point of intersection in between the line $y = 3(x + 1)$ and hyperbola $\frac{y^2}{9} - \frac{x^2}{4} = 1$.

Q-V (a) Show that the chords AB and DE are equidistant from the centre (0, 0) of circle $x^2 + y^2 = 9$ and the end points of chord are A (– 3, 0), B (0, 3), D (0, – 3 ) and E (3, 0).

(b) Find $\frac{dy}{dx}$ when $y = 4\cot\sqrt{x^2 - 1}$.

Q-VI (a) Evaluate $\lim_{x \to 25}\left(\frac{\sqrt{x} - 5}{x - 25}\right)$.

(b) If $u = \tan^{-1}\left(\frac{x^2 + y^2}{x + y}\right)$ then show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \tan u$.