



Name

Roll No

1- ہر سوال کے ساتھ چار دائرے دیئے گئے ہیں، صرف صحیح جواب والا دائرہ بھر دیں۔

2- دائروں کو شیڈ (بھرے) کے لئے نیچے یا بالے رنگ کا کارڈ استعمال کریں۔

3- جواب میں ایک سے زائد دائرے بھرنے سے جواب غلط تصور ہو گا۔

Time Allowed: 20 Minutes

SECTION – A

Marks : 20

- 1 The coordinates of the foci for the ellipse $9x^2 + 25y^2 = 255$ are: ☐ $(\pm 3, 0)$ ☐ $(0, \pm 4)$ ☒ $(\pm 4, 0)$ ☐ $(\pm 5, 0)$
- The order of the differential equation $\left(\frac{d^2y}{dx^2}\right)^4 + 4x\left(\frac{dy}{dx}\right)^2 = e^x$ is: ☐ 1 ☐ 2 ☒ 3 ☐ 4
- 3 The ODE $x \frac{dy}{dx} + 6y^2 = e^x$ is: ☐ Linear, First Order ☐ Linear, Second order ☒ Non-linear, First Order ☐ Non-linear, Second order
- 4 If $f(x, y) = e^x \sin y + x^2y$, then f_x should be: ☐ $e^x \sin y + x^2$ ☒ $e^x \sin y + 2xy$ ☐ $e^x \cos y + x^2$ ☐ $e^x \cos y + 2x$
- 5 For $f(x) = \cos x$ on the interval $[0, 2]$, the updated interval after the first iteration of the Bisection Method is: ☐ $[0, 1]$ ☐ $[0.5, 1.5]$ ☒ $[1, 2]$ ☐ $[1.5, 2]$
- 6 The rate of convergence of the Newton-Raphson method is: ☐ Linear ☒ Quadratic ☐ Cubic ☐ Logarithmic
- 7 If $F(x)$ is an ant-derivative of $f(x) = 3x^2$, and $F(1) = 4$, the specific equation for $F(x)$ is: ☒ $F(x) = x^3 + \frac{1}{4}$ ☐ $F(x) = x^3 + \frac{1}{3}$ ☐ $F(x) = x^3 + \frac{1}{1}$ ☐ $F(x) = x^3 + \frac{1}{5}$
- 8 The correct value of $\int (3e + a) dx$ is: ☒ $(3e + a)x + C$ ☐ $3cx + a$ ☐ $cx + 3$ ☐ $3e + a$
- 9 To evaluate $\int x^2 e^{x^3} dx$ is: ☐ $u = x^2$ ☐ $u = x^3$ ☒ $u = e^{x^3}$ ☐ $u = x$
- 10 The correct equation for a straight line that is parallel to the x-axis and passes through the point $(-2, 7)$ is: ☒ $y = 7$ ☐ $x = 7$ ☐ $y = -2$ ☐ $x = -2$
- 11 For the horizontal line $y = 5$, any point (x, y) where $y < 5$ is located: ☐ At the origin ☐ In the region below the line ☒ Above the line ☐ At the y-axis
- 12 The center of the Circle having equation $(x + 4)^2 + (y - 1)^2 = 9$ is: ☒ $(-4, -1)$ ☐ $(4, -1)$ ☐ $(-4, 1)$ ☐ $(4, 1)$
- 13 The line represents the directrix of the parabola $x^2 = -4y$ is: ☐ $y = 1$ ☐ $y = -1$ ☒ $x = 1$ ☐ $x = -1$
- 14 The statement " $x \rightarrow a$ ", implies about: ☐ x must approach a from the left side only ☐ x must approach a from the right side only ☒ x can approach a from either the left or the right side ☐ x approaches a by jumping across the value a
- 15 The correct value of the limit: $\lim_{x \rightarrow 2} \frac{\sqrt{x} - \sqrt{2}}{x - 2}$ is: ☐ 0 ☐ $\frac{1}{\sqrt{2}}$ ☐ $\frac{1}{2}$ ☒ $\frac{1}{2\sqrt{2}}$
- 16 If a car travels a distance d over time t, the rate of change $\frac{dd}{dt}$ represents: ☐ Total distance covered ☐ Acceleration ☒ Speed (velocity) ☐ Displacement
- 17 Derivative of $y = \tan x$ is: ☒ $\sec^2 x$ ☐ $\cos^2 x$ ☐ $-\sin x$ ☐ $\cos^2 x$
- 18 The 2nd derivative of $f(x) = 5x^5$ is: ☐ $25x^4$ ☐ $25x^5$ ☒ $100x^3$ ☐ $100x^4$
- 19 If $f(t) = \tan t + \ln(t + 1)j + etk$, is a vector function, the value of t excluded from the domain is: ☐ 0 ☐ 1 ☐ π ☒ $\frac{\pi}{2}$
- 20 The most general ant-derivative of $f(x) = \frac{1}{\cos^2 x}$ is: ☒ $\tan x + C$ ☐ $\sin x + C$ ☐ $\cot x + C$ ☐ $\sin^2 x + C$

PR XII (A-I-AP3) 26
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. Evaluate the limit of: $\lim_{x \rightarrow 7} \frac{\sqrt{x+2}-3}{x-7}$
2. Find derivative of the implicit function $x^3 + y^3 = 6xy$
3. Find equation of the tangent line to the curve $y = (x^2 + 1)e^{2x}$ at $x = 0$
4. Find the vector derivative of $F(x) = e^{-x}i + \tan^{-1}xj - \frac{1}{x}k$
5. Evaluate the integral and check the result through differentiation $\int \frac{4x^6 + 1}{x^3} dx$
6. Evaluate the integral $\int x \sec^2 x dx$
7. Find the angle from the line $2x + 4y - 10 = 0$ to the line $5x - 3y + 1 = 0$
8. Find equation of a line if the x - intercept and y - intercept of the line are $x : (2, 0)$ and $y : (0, 3)$
9. Find the center and radius of the Circle $2x^2 + 2y^2 + 10x + 2y + 10 = 0$
10. Find equation of Tangent and Normal at a point $(0, 3)$ to the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$
11. Translate to parallel axes through the point $(2, -3)$ the conic $3x^2 + 3y^2 - 12x + 18y + 15 = 0$
12. Find the general solution of the non-linear differential equation $\frac{dy}{dx} = (4x + y + 1)^2$
13. Perform two iteration of Bisection Method to approximate the actual root r of the function $f(x) = \tan x + x - 1$ in the interval $[0, 0.8]$

Section – C

Marks: 30

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

- Q-III** (a) Determine the $\lim_{x \rightarrow \infty} \frac{x^2 + 5x}{3x^2 - 2}$
- (b) Find derivative of $y = \tan^{-1}\left(\frac{1+x}{1-x}\right)$
- Q-IV** (a) Find the area between the x - axis and the curve $f(x) = 4 - x^2$ from $x = -2$ to $x = 2$
- (b) Find the point of intersection $P(x, y)$ of the pair of lines $3x - y = 0$ & $x + 2y = 7$
- Q-V** (a) Prove that the line $y = 2x + 5$ touch the circle $x^2 + y^2 - 5 = 0$. Find also the contact point.
- (b) Find vertices, foci, eccentricity and the asymptotes of the hyperbola $4x^2 - 9y^2 = 64$
- Q-VI** (a) Use Euler's Theorem to verify the function $f(x, y) = \frac{x^3 + y^3}{x^2 + y^2}$ is a homogenous function of degree 1.
- (b) Find iterate x_3 of Newton Raphson Method for the function $f(x) = x^4 - x - 10$ with $x_0 = 2$.