Reg. No……. Name…… **25U2053**

B A, B SC, B COM DEGREE END SEMESTER EXAMINATION - APRIL 2025

UGP (HONS.) SEMESTER - 2: DISCIPLINE SPECIFIC COURSE

COURSE: 24UMATDSC102: GATEWAY TO MATHEMATICS

(For Regular 2024 Admission)

Time: 2 Hours Max. Marks - 70

PART A

Each question carries 2 marks. A maximum of 10 marks can be scored from this part.

1. Evaluate $\int_0^1 (3x^2+2x)\,dx$. [CO 1]
2. Define definite integral of a function. [CO 1]
3. Write the formula for the length of the curve. [CO 2]
4. Evaluate $\int_0^1 \int_0^2 (x+5)\,dy\,dx$. [CO 2]
5. Find the first order partial derivatives of $f(x,y) = 4x^2y^3$. [CO 3]
6. Find $\frac{dy}{dx}$, if $x^3 + y^2x - 3 = 0$. [CO 3]
7. Define critical points. [CO 4]
8. Find the gradient of $f(x,y,z) = xy^2z^3$ at the point (1,1,1). [CO 4]

PART B

Each question carries 5 marks. A maximum of 30 marks can be scored from this part.

9. Evaluate $\int_{-\pi/4}^{\pi/4} sec\,x\,tan\,x\,dx$. [CO 1]
10. Find the area under the curve $y = \cos x$ over the interval $\left[0, \frac{\pi}{2}\right]$. [CO 1]
11. Find the arc length of the curve $y = x^{3/2}$ from (1,1) to $(2,2\sqrt{2})$. [CO 2]
12. Find the area of the region enclosed by $y = x^2$ and $y = x + 6$. [CO 2]
13. Find the second order partial derivatives of $f(x,y) = x^2y^3 + x^4y$. [CO 3]
14. Find an equation for the tangent plane and parametric equations for the normal line to the surface $z = x^2y$ at the point (2,1,4). [CO 4]
15. If $z = x^2y$, $x = t^2$, $y = t^3$, then find $\frac{dz}{dt}$ using chain rule. [CO 3]
16. Find the directional derivative of $f(x,y) = e^{xy}$ at (-2,0) in the direction of the unit vector that makes an angle of $\frac{\pi}{3}$ with the positive x axis. [CO 4]

PART C

Each question carries 15 marks. A maximum of 30 marks can be scored from this part.

17. Evaluate $\int_0^3 f(x)\,dx$ if $f(x) = \begin{cases} x^2, & x < 2 \\ 3x - 2, & x \geq 2. \end{cases}$ [CO 1]

18. Use a double integral to find the volume of the solid that is bounded above the plane $z = 4 - x - y$ and below by the rectangle $R = [0,1]x[0,2]$. [CO 2]

19. Locate all relative extrema and saddle points of $f(x,y) = 4xy - x^4 - y^4$. [CO 4]

20. If $w = e^{xyz}$, $x = 3u + v, y = 3u - v, z = u^2v$, then using chain rule find $\frac{\partial w}{\partial u}$ and $\frac{\partial w}{\partial v}$. [CO 3]