Laxmi Charitable Trust's

Sheth L.U.J College of Arts & Sir M.V. College Of Science & Commerce

Department of Computer Science

Question Bank:
Calculus
Semester – II

Unit 1

1. 1. Show that the function f(x) = x^3- 9x^2 +30x + 7 is always increasing.
2. Find the absolute maximum and minimum values of f(x)= $(x-2)^2$ in [1,4].
3. Using Newton's method find the approximate root for the equation f(x)=x- cos x.
4. Find the relative extrema of $f(x)$ = $3x^5 - 5x^3$.
5. Discuss the continuity of the function f(x)=$\sqrt{4-x^2}$
6. Divide 100 into two parts such that sum of their square is minimum.
7. Show that $|x|$ is continuous everywhere.
8. A garden is to be laid out in a rectangular area and protected by a chicken wire fence. What is the largest possible area of the garden if only 72 running feet of chicken wire is available for the fence?
9. Find the asymptotes of the function y= $\frac{x}{(x+1)(x+2)^2}$.
10. Determine whether the following limit exists. If so, find its value. $\lim_{(x,y)\to(0,0)} \frac{x^4-y^4}{x^2+y^2}$.

Unit 2

1. Find the area under the curve y = x^3 over the interval [2,3].
2. Solve dy/dx = 1 – y; y(0) = 0, find y(0.1) and y(0.3) using Euler's method. Taking h = 0.1.
3. Solve differential equation $\frac{dy}{dx} = -xy$
4. Find the approximate value of $\int_1^2 \frac{1}{x^2}\,dx$ using Simpson's rule with n=10.
5. Find the area of the region that is enclosed between the curves $y = x^2$ and $y = x + 6$.
6. Find the area of the region bounded above by y = x+6, bounded below by y = x^2 and bounded on the sides by the lines x = 0 and x = 2.
7. Use Euler's Method with a step size of 0.2 to find approximate solution of the initial-value problem $dy/dx=y-x$, (x)=2 over $0 \le x \le 1$.
8. Evaluate ∫ 1/(9 cos2x + 4 sin2x) dx
9. Show that $y = xe^{-x}$ satisfies the equation $xy' = (1-x)y$.
10. Solve the differential equation x (x + y) dy - y^2 dx = 0

Unit 3

1. Find an equation of the tangent plane to the surface $x^2 + 4y^2 + z^2 = 18$ at the point (1.,2,1). Also find the parametric equation of the line that is normal to the surface at the point (1,2,1).
2. Find all relative extrema and saddle points of $f(x,y) = 4xy - x^4$.
3. Find $f_x(1,3)$ and $f_y(1,3)$ for the function $f(x,y) = 2x^3y^2 + 2y + 4x$.
4. Evaluate $\lim_{(x,y)\to(0,0)} y.\log(x^2+y^2)$, by converting to polar coordinates.
5. Evaluate $\lim_{(x,y)\to(0,0)} \sqrt{x^2+y^2}\,\log(x^2+y^2)$ by converting to polar coordinates.
6. Find the directional derivative of f(x, y)=e^{xy} at (2,0) in the direction of unit vector that makes an angle of $\pi/3$ with the positive x-axis.
7. Find the second order derivatives of f(x, y)=$y^2e^x + y$

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8. Find the directional derivative of $(x, y, z)=x^2y-yz^3+z$ at the point (1, 2, 0) in the direction of the vector $a=2i+j-2k$.
9. Find the gradient vector of f(x, y) if f(x, y) $=x^3+2xy^2$. Evaluate it at (-3, -4).
10. Locate all relative extrema and saddle points of f(x, y)=$x^3+2y^3-3x^2-24y+16$.