Federal Urdu University Of Arts, Science & Technology

DEPARTMENT OF COMPUTER SCIENCE

Subjects: Multi-variate Calculus **Semester: 5th** **Submit Date: 01-Aug-2021**

Attempt All Questions **Section (C)** **Assignment**

[1]. Question

a. Find the Unit normal and binormal vector for the circular helix
$r(t) = (cost)i + (sint)j + (t)k$

b. Find the curvature and the radius of the curvature at the stated point
$x = sint,\ y = cost,\ z = \frac{1}{2}t^2,\ t = 0$

[2]. Question

a. Determine whether the limit exists if so, find the value
$\lim_{(x,y)\to(0,0)} \frac{xy}{3x^2+2y^2}$

b. Discuss the continuity of the function

$$f(x,y) = \begin{cases} \frac{2xy}{x^2+y^2} & , (x,y) \neq (0,0) \\ 0 & , (x,y) = (0,0) \end{cases}$$

[3]. Question

a. $f(x,y) = \begin{cases} 0\ , & xy \neq 0 \\ 1\ , & xy = 0 \end{cases}$

i. Show that $f_x(x,y)\ and\ f_y(x,y)$ exist at the origin.

ii. Prove that f is not continuous at the origin.

b. Compute du , $u = sint + 5sinx^2 + z^3$

[4]. Question

a. Show that the function

$u = \ln(x^2 + y^2)$ $v = 2\tan^{-1}\left(\frac{y}{x}\right)$

Satisfy the Cauchy-Riemann equation.

b. $\frac{\partial z}{\partial u}$ & $\frac{\partial z}{\partial v}$

$z = e^{x^2y}\ ,\ x = \sqrt{uv},\quad y = \frac{1}{v}.$

[5]. Question

a. $\int\int_R x^2 dA,\ R$ Is a Region in the first quadrant enclosed by
$xy = 1\ , y = x\ \ and\ \ y = 2x.$

b. Evaluate Triple Integral
$\int_0^1 \int_0^{1-y} \int_0^2 dxdzdy$