Instructor: Dr. Asfand Fahad

Course: Multivariable Calculus (MTH-105)

Program: BSCS-B16, BSSE-B10

Student Name :

Time: 01 Hours

Marks: 10

Date: 15-10-2018

Reg. No.

Q.1 (i) Find equation of all Horizontal and Vertical Tangents to the parametric curve:
$x(t) = \frac{t^3}{3} - \frac{t^2}{4} - \frac{t}{2} - 2$ and $y(t) = \frac{t^3}{3} - \frac{5}{4}t^2 + \frac{3}{2}t + 3$.

(ii) Find the Center and Radius of the sphere $3x^2 + 3y^2 + 3z^2 + \sqrt{2}x + \sqrt{5}y + z = 0$ and interpret $3x^2 + 3y^2 + 3z^2 + \sqrt{2}x + \sqrt{5}y + z \le 0$ and $3x^2 + 3y^2 + 3z^2 + \sqrt{2}x + \sqrt{5}y + z > 0$.

(03+02)

Q.2 (i) Find the Arc-length of the parametric curve $x(t) = e^t \cos t$ and $y(t) = e^t \sin t$ from $t = 0$ to $t = \pi$.

(ii) Let $u = 2i - j + 3k$ and $v = -3i - 2j + k$. Find $Proj_v u$ and express u as sum of vectors parallel to v and orthogonal to v.

(iii) Find the component form of the vector with magnitude $\sqrt{3}$ and making an angle $\frac{2\pi}{3}$ with positive x-axis.

(02+02+01)