

Year) 2nd (ES) 2016

University of Engineering & Technology Lahore

Department of Computer Science

End Semester (2017)

Examination: BSc. Computer Science

Time: 90 Min.

Subject: Multivariate Calculus

Marks: 40

Name: _____ Roll No. _____

Note:- Attempt All questions. Do not write anything on the question paper except your name and roll number.

- Find the absolute maximum and minimum values of

$$f(x, y) = 2 + 2x + 2y - x^2 - y^2$$

on the triangular region in the first quadrant bounded by the lines
 $x = 0, y = 0, y = 9 - x.$

(7)

- Assume that $w = f\left(ts^2, \frac{s}{t}\right)$, $\frac{\partial f}{\partial x}(x, y) = xy$ and $\frac{\partial f}{\partial y}(x, y) = \frac{x^2}{2}$. Find $\frac{\partial w}{\partial t}$ and $\frac{\partial w}{\partial s}$.

(3,3)

- Find the directional derivative of $\varphi = x^2 + y^2 + z^2$ at the point $(2, 1, 1)$ in the direction towards the point $(1, 1, 0)$.

(6)

- If $\frac{d^2 \vec{r}}{dt^2} = 4t \hat{i}$ and $\vec{r}(t) = \vec{0}$ and $\frac{d\vec{r}}{dt} = 4\sqrt{t} \hat{j}$, when $t = 0$, show that the tip of the position vector $\vec{r}(t)$ describes a parabola.

(7)

- Find the volume of the wedgelike solid that lies beneath the surface $z = 16 - x^2 - y^2$ and above the region R bounded by the curve $y = 2\sqrt{x}$, the line $y = 4x - 2$, and the x -axis.

(7)

- Find the volume of the region D enclosed by the surfaces $z = x^2 + 3y^2$ and $z = 8 - x^2 - y^2$.

(7)