Dr. R.S. Rajbansi

Jaypee University of Information Technology, Waknaghat

TEST - I, September 2017

B.Tech (ECE/CSE/IT/CE)

Course Code: 10B11MA111
Course Title: Mathematics-I
Course Credits: 4

Max. Marks: 15

Max. Time: 60 min

Instructions: ALL questions are compulsory and carry equal marks.

1. Consider $\mathtt{f}(x,\ y) = \dfrac{x^2 - y^2}{x^2 + y^2}$.
   (a) Find $\lim\ \mathtt{f}(x,\ y)$ as you approach origin along the line $y = 3x$.
   (b) Find $\lim\ \mathtt{f}(x,\ y)$ as you approach origin along the parabola $y = 5x^2$.
   (c) Is $\mathtt{f}(x,\ y)$ continuous at $(0,\ 0)$? Justify your answer.
2. Compute the second degree Taylor approximation of $\mathtt{f}(x,\ y) = e^{x^2 - y}$ around $(0,\ 0)$.
3. Minimize $\mathtt{f}(x,\ y) = x^2 - y^2$ subject to $x = 2y - 1$, using Lagrange's multiplier method.
4. Find the value of $\frac{\partial x}{\partial z}$ at the point $(1, -1, -3)$ if the equation $xz + y \ln x - x^2 + 4 = 0$ defines x as a function of two independent variables y and z, and the partial derivative exists.
5. Consider the double integral $\displaystyle\int_0^1 \int_y^{\sqrt{y}} \mathtt{d}x\mathtt{d}y$.
   (a) Sketch the region of integration and evaluate the integral.
   (b) Write an equivalent integral with order of integration reversed and evaluate the same.

MA-2, BT