DEPARTMENT OF MATHEMATICS
NATIONAL INSTITUTE OF TECHNOLOGY, KURUKSHETRA

B.Tech. First Semester (CE, EE, EC, ME, PI)
Differential Calculus and Differential Equations (MAIC-101)

Mid Term Examination- I
M. M.: 20
Time: 9:30 a.m.- 10:20 a.m. (Shift-I)

NOTE: *Attempt all the Questions.*

Q1. Check the continuity of the following function at (0,0). [5]

$$f(x) = \begin{cases} \dfrac{x^4 - y^4}{x^4 + y^4} & if\ (x,y) \neq (0,0) \\ 0. & if\ (x,y) = (0,0) \end{cases}$$

Q2. Find the value of k so that the equations $x + ky + 3z = 0, 4x + 3y + kz = 0, 2x + y + 2z = 0$ have a non- trivial solution. [5]

Q3. Consider the quadratic form $q(x) = 2x^2 + 2y^2 + 3z^2 + 2xy - 4yz - 4xz$

a) Find its eigen values and their corresponding eigen vectors. [3]
b) Find its rank, index and signature. [3]
c) Find the nature of the given quadratic form. [1]
d) Find its matrix of transformation. [1]
e) Find its canonical form. [2]