# Tutorial Sheet-1 (Even Semester, 2022) [Physics-2 (15B11PH211)]

**Assignment 1:** Show the proof of Gauss’s law for the charge inside and outside the Gaussian surface.

1. Find the gradient of the function

*f ( x, y,z )*  *x*2  *y*3  *z* 4

at the point (2, -3, -4).

1. If *A*  *y* 2*i*  *(* 2*xy*  *z* 2 *) j*  2 *yzkˆ* , then calculate divergence of *A* at point (1, 2, 3).

→ *ˆ*

1. Obtain curl

→

*A* , where

*A*  *yzi*  *xzj*  *xyk* .

1. A region is specified by the potential function, given by   4*x*2  3*y* 2  9*z* 2 . Calculate electric field strength at any point (3, 4, 5) in this region.
2. Find the charge in the volume defined by

0  x  1 m,

0  y  1

m and

0  z  1

m if

  30x 2 y .

What change occurs for the limits  1  y  0 m.

1. A spherically symmetric volume charge distribution of radius ‘a’ is described by

(*r*  *a*) = 0

*r* (C/ *m*3)

*a*

; (r  a) = 0 . Calculate the total charge.

1. Three point charges Q1 = 30 nC, Q2 = 150 nC and Q3 = -70 nC are enclosed by surface S. What net flux crosses S.
2. Five thousand lines of force enter a volume of space and three thousand lines leave it. How much charge is contained in it?
3. In the region of space electric field

*S*  100*kˆ* .

*E*  8*i*  4 *j* *kˆ* , calculate the electric flux through the surface