1. Draw the onDirac-Delta function d(x2-42) in the plot d(x) *vs*. x. [1]
2. Calculate d(x-4) [1]
3. Consider a solid sphere of radius ‘R’ and dielectric constant e. If the charge distribution of this solid sphere is *r* (r,q,f) = Krf where “k” is constant.

Calculate the electric field “E” and displacement vector “D”. [3]

1. Calculate the Poynting vector of an electromagnetic wave traveling in free space with the electric field = Cos(kx-wt) Cos(kx-wt); x,y,z are the cartesian coordinates. [2]
2. Chart

   Description automatically generatedConsider a rectangular loop of dimensions ‘a’ and ‘b’ in the XY-plane, as shown in the below figure. If a time-dependent magnetic field **B** is applied along the Z-direction. = (x2 t2+ y2 t2+2xyt)

What is the induced voltage(e.m.f.) in that loop at a time t?   
 [3]

1. Draw the Dirac-Delta function **d(Sin(px))** in the plot **d(x) *vs*. x**. [1]
2. Calculate the Poynting vector of an electromagnetic wave traveling in free space with the electric field = Cos(kx-wt) (kx-wt); x,y,z are the cartesian coordinates. [1]
3. A dielectric sphere of radius ‘**R’** centered at the origin carries a polarization = due to bound charges, where ‘**K’** is a constant and ‘**r**’ is the distance from the Centre. Calculate the (a) Polarization volume charge density, (b) Electric field inside and outside the sphere, and (c) Displacement Vector using Gauss’s Law [4]
4. A parallel plate capacitor with **circular plates** of radius ‘**R’** is being charged at a uniform rate **dE/dt=K** Volt-m-1sec-1. ‘**K’** is a constant (**K**≠0), ‘**E**’ is electric field. (a)Find the displacement current **Id** for the capacitor? (b) Find the induced magnetic field at radial distance ‘r’ from the center of the capacitor (r≤R and r≥R)? [Hints: Use cylindrical surface to calculate B]