**FACULTY OF INDUSTRIAL
SCIENCES & TECHNOLOGY**

**MATERIAL TECHNOLOGY PROGRAMME**

# ELECTRICITY, MAGNETISM & OPTICS
by Muhammad Hafiz bin Mazwir

### CH02: GAUSS'S LAW

1.  A square plate with length 3.0 cm is oriented at 55° to a uniform electric field with magnitude $3.0 \times 10^2$ N/C. Calculate the electric flux passing through the plate.

2.  An object with excess charge +2.5 nC is surrounded by an imaginary sphere of radius 0.1 cm centered on the charge. Find the electric flux passing though this imaginary sphere.

3.  Figure 2.1 shows four charged objects, each with charge +3$e$, +4$e$, -$e$ and -5$e$ surrounded by several closed surface, $S_1$, $S_2$, $S_3$ and $S_4$. Determine the electric flux passing through each of the closed surfaces.
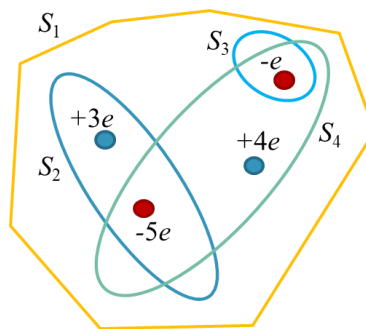


Figure 2.1

4.  A charged object with 15 μC is inside a cube with 5 cm sides. Find the net electric flux through each of the cube's six surfaces.

5.  Determine whether this statement is true or false. The net electric flux passing through any closed surface cannot be zero. If this statement is false, provide an example.

6.  A very long thin conductor has a linear charge density of 37 nC/cm. Calculate the electric field at a point 0.5 cm from the conductor.