

**King Saud University**  
**College of Engineering**  
**Electrical Engineering Department**

EE203 - Electromagnetics (1)

Final Exam

Date: 16/7/1413

Time: 3 hrs.

Answer All Questions

Q.1

a) Given  $G = X / Y \hat{x}$  Find  $G$  in spherical coordinate system.

b) State the definition of the electric field intensity.

c) Show that the electric field of an infinite sheet of charge is  $E = \frac{\rho_s}{2\epsilon_0} \hat{n}$ . You can use the infinite line charge results.

Q.2

a) The cylindrical surface  $-1 < Z < 1$ ,  $\rho = 0$  carries a surface charge density  $\rho_s = \rho_0 \cos^2 \phi$ . Find the electric field intensity along the Z-axis. Sketch the results.

b) Let  $E = \frac{\rho_0}{2\epsilon_0} \hat{z}$

Evaluate both sides of the divergence theorem over the cylinder

Q.3

a) Given a point charge  $Q = +1 \text{ nC}$  at  $(2, 0, 0)$  and a line charge  $\rho_l = 1 \text{ nC/m}$  at  $Z = 2, Y = 0$  and a sheet of charge  $\rho_s = 1 \text{ nC/m}^2$  at  $Z = 2$ .

at  $Z=-3$ . Find the field every where.

b) If  $D=Z z$  C/m. Evaluate  $Q= \int D \cdot dS$  over the surface of the sphere  $r=2\text{cm}$ .

Q.4

a) Let  $E=$

Find the work that need to be done to move a point charge from B:( ) to A:( ). Find at P:( )

b) a dipole having a moment  $P=$  is located at Q