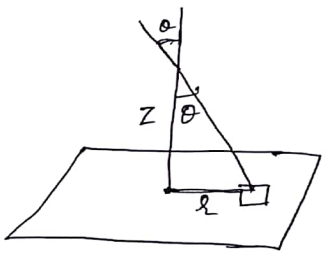
Ans 14) (a) let us consider a small elemental area ($dA = dx\,dy$) at a distance (x, y) from origin.



$$\therefore \quad df = \frac{G\sigma\, dx\, dy}{(x^2+y^2+z^2)}$$

$$F_z = \int df \cos\theta = \iint \frac{G\sigma\, dx\, dy}{(x^2+y^2+z^2)} \cos\theta$$

But $\cos\theta = \frac{z}{r} = \frac{z}{(x^2+y^2+z^2)^{1/2}}$

$$\therefore \quad F_z = \int_{-L/2}^{L/2} \int_{-L/2}^{L/2} \frac{G\sigma z\, dx\, dy}{(x^2+y^2+z^2)^{3/2}}$$

Proved.