Name: ───────────── **Section:** ─────── **Score:** ───────/20

1. As shown in Figure 1 several point charges are fixed in space, making an electric field $\boldsymbol{E}$ in a plane. At the origin O the electric field is given by $\boldsymbol{E} = (3.2, 0.5) \times 10^3$ N/C.
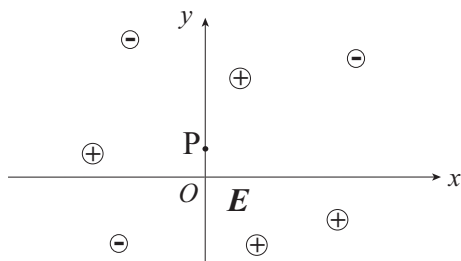

Figure 1:

(a) A charge $q = 8.5\ \mu$C is placed at the origin. What is the magnitude of the force acting on this charge q? [5]

(b) Now, the charge q in (a) is moved to location P whose coordinate vector is given by $(0, 3)$ m. What is the electric field vector at the origin due to all the charges? [5]

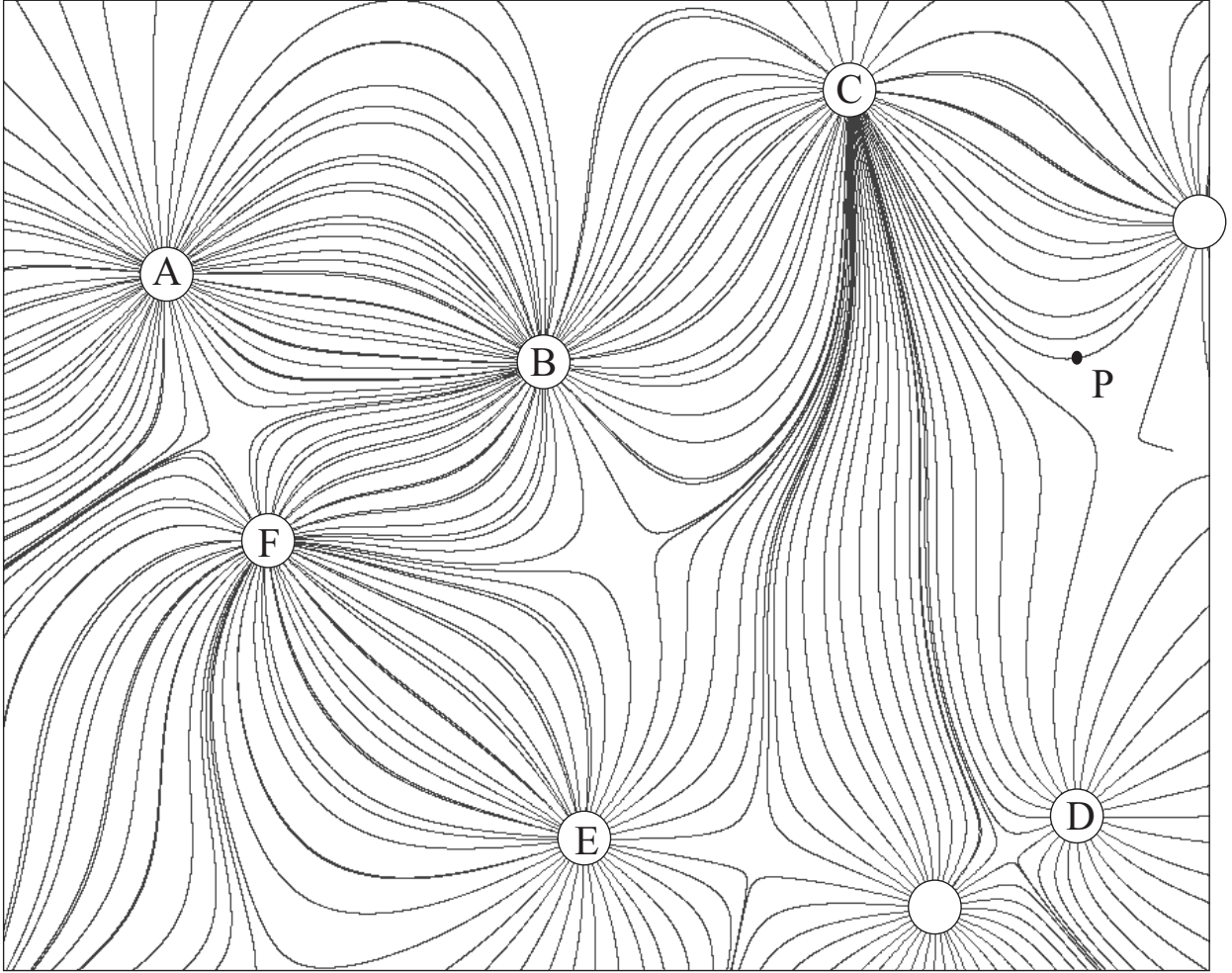**2**. Electric field lines due to more than 8 charges on a plane are depicted in Fig. 2.

Figure 2:

(a) Suppose charge A is negative. Give all the negative charges among B-F. [4]

(b) There are locations where the electric field is zero. Mark at least two of them with X in the figure. [3]

(c) Draw the direction of the electric field at P. [3]