P1 - Ch18 (30%) [Electric force/field]

a) $q_1 = q_2 = q_3 = q_4 = 10 \mu C$ in Fig. 1. Find the electric force exerted on $q_3$, Mag. $957 \ N$, Dir. y

b) $Q_1 = Q_2 = 20 \mu C$ in Fig. 2. Find the electric field at point $P_1$, Mag. $1.4E8 \ N/C$, Dir. y

c) If $Q_1 = -10 \mu C$, $Q_2 = 10 \mu C$ in Fig. 2. Recalculate electric field at $P_1$, Mag. $7.0E7 \ N/C$, Dir. -x

P2 - Ch19 (20%) [Electric potential/potential energy]

a) In Fig. 2, $Q_1 = Q_2 = 20 \mu C$, find the electric potential at $P_1$. Ans. $8.5E6 \ V$

b) Find the electric potential at $P_2$. Ans. $6.2E6 \ V$

c) Find the work needed to move a point charge $q = 25 \mu C$ from point $P_2$ to $P_1$. Ans. $57.5 \ J$

d) If a point charge $q = 25 \mu C$ is placed at $P_1$, what is the electric potential energy of this charge? Ans. $212.5 \ J$

P3 - Ch19 (25%) [Capacitors]

a) In Fig. 3, $C_1 = 10 \mu F$, $C_2 = C_3 = 5 \mu F$. Find the total capacitance connected to the 9-V battery. Ans. $5 \ uF$

b) Find the voltage on $C_2$. Ans. $4.5 \ V$

c) Find the charge on $C_1$. Ans. $45 \ uC$

d) Find the electric energy stored on $C_1$. Ans. $101 \ uJ$

e) Find the current passing through the battery at equilibrium. Ans. $0$

P4 - Ch21 (25%) [Ohm’s law, power]

a) In Fig. 4, what is the current in $R_1$? Ans. $0.17 \ A$

b) The current in $R_2$? Ans. $0.11 \ A$

c) The current on $R_3$? Ans. $0.06 \ A$

d) The voltage on $R_4$? Ans. $3.4 \ V$; e) the electric power on $R_4$? Ans. $0.58 \ W$