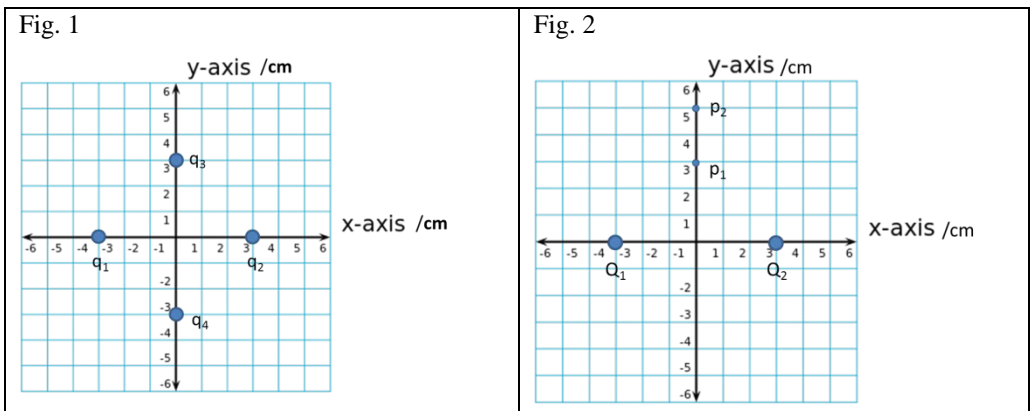**P1 - Ch18 (30%) [Electric force/field]**

    a) $q_1 = g_2 = q_3 = q_4 = 20$ μC in Fig. 1. Find the electric force exerted on q_3, Mag._3838 N__, Dir._____ y ___

    b) $Q_1 = Q_2 = 20$ μC in Fig. 2. Find the electric field at point P_1, Mag. _1.4E8 N/C__, Dir._____ y _____

    c)   If $Q_1 = -10$ μC, $Q_2 = 10$ μC in Fig. 2. Recalculate electric field at P_1, Mag.__7E7 N/C ___, Dir._____ - x _____
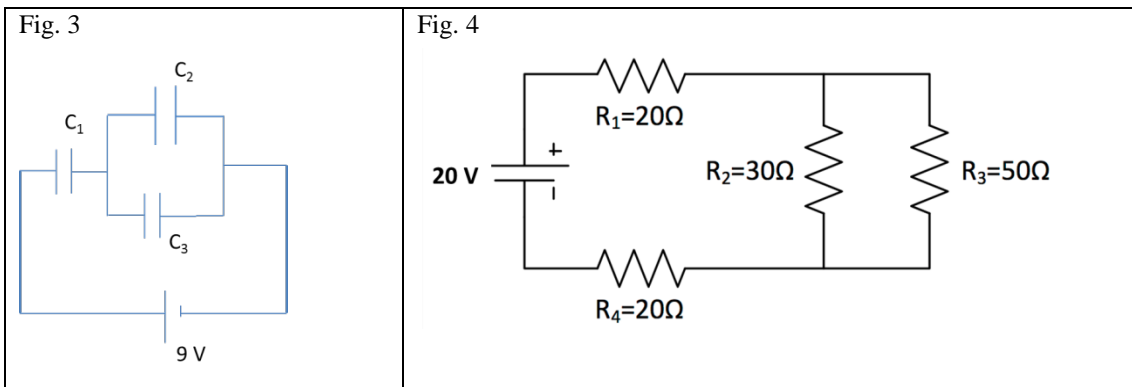
Fig. 1

Fig. 2

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

    a)   In Fig.2, $Q_1 = Q_2 = 40$ μC, find the electric potential at P_1. Ans._____1.7E7 V___

    b)   Find the electric potential at P_2. Ans._____1.24E7 V_____

    c)   Find the work needed to move a point charge q = 25 μC from point P_2 to P_1. Ans. _____115 J _____

    d)   If a point charge q = 25 μC is placed at P_1, what is the electric potential energy of this charge? Ans.____425 J_____

P3- Ch19 (25%) [Capacitors]

    a)   In Fig. 3, $C_1 = 40$ μF, $C_2 = C_3 = 20$ μF. Find the total capacitance connected to the 9-V battery. Ans.___20 uF ___

    b)   Find the voltage on C_2, Ans. _____4.5 V _____

    c)   Find the charge on C_1, Ans. _____ 180 uC _____

    d)   Find the electric energy stored on C_1, Ans. _____405 uJ ___

    e)   Find the current passing through the battery at equilibrium. Ans. ____0 ____

Fig. 3

Fig. 4

P4 - Ch21 (25%) [Ohm's law, power]

    a)   In Fig. 4, what is the current in R_1? Ans._____0.34 A _____

    b)   The current in R_2? Ans._____0.21 A _____

    c)   The current on R_3? Ans._____0.13 A ___

    d)   The voltage on R_4? Ans.____6.8 V ____; e) the electric power on R_4? Ans.____2.31 W_____