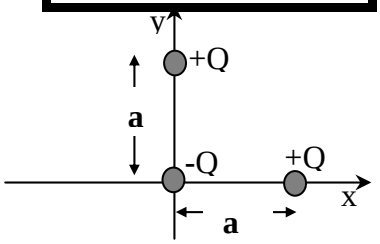
Name: No. Sec. ( )

PHYCS 102 Test 1 12/4/2004

$k=9\times10^{9}\ Nm^2/C^2$, $\varepsilon_0=8.85\times10^{-12}\ C^2/Nm^2$, $e=1.6\times10^{-19}C$, $m_e=9.11\times10^{-31}Kg$, $nC=10^{-9}C$

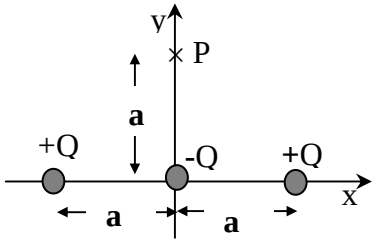
MCQ(/54)	Problem 1 (/16)	Problem 2 (/30)	Total (/100)
			Total (/15)

Q1: Three charges are placed as shown in the figure. If Q=(10,15,20,25) μC and a=0.3 m, then the **magnitude** of the electric force (N) on the charge –Q due to the other charges is:



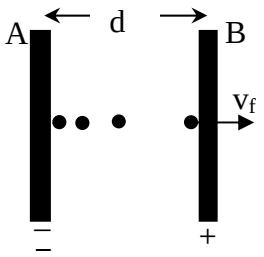
(A) 14.2 (B) 31.8 (C) 56.6 (D) 88.4

Q2: Three charges are placed as shown in the figure. If Q=(10,15,20,25) nC and a= 0.3 m, then the electric potential (in V) at point P is:



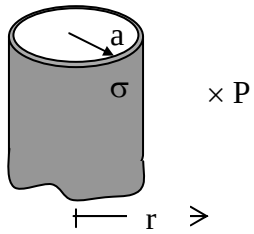
(A) 124.3 (B) 186.4 (C) 248.5 (D) 310.6

Q3: An electron is released from rest from the negative plate A as shown in the figure. If the plates separation is d=0.1 m and the potential difference between them is 400,900,1600,2500 V then the electron's speed (in m/s) as it strikes plate B is:



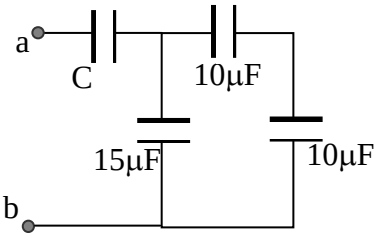
(A) 1.18×10^7 (B) 1.77×10^7 (C) 2.37×10^7 (D) 2.96×10^7

Q4: A hollow long conducting cylindrical shell of radius a=0.2 m carries a surface charge density $\sigma=8.85\ nC/m^2$. The electric field (in N/C) at point P that is located at r=1,0.8,0.5,0.4 m is:



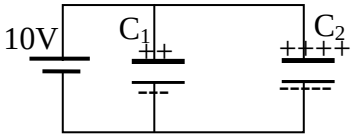
(A) 200 (B) 250 (C) 400 (D) 500

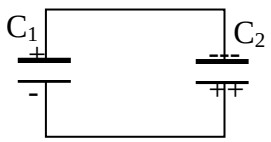
Q5: For the net of capacitors shown in the figure, If C= 5,12,20,60 μF then the equivalent capacitance (in μF) between point a and b is:



(A) 4 (B) 7.5 (C) 10 (D) 15

Q6: Two capacitors C_1=2 μF and C_2=4,6,8,10 μF are charged by a 10 volt battery. If the battery is removed and the capacitors are re-connected **with opposite polarity** as shown in the figure, then the final charge on C_1 (in μC) is:

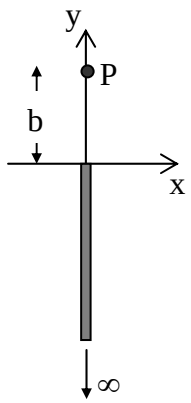




(A) 6.66 (B) 10 (C) 12 (D) 13.33

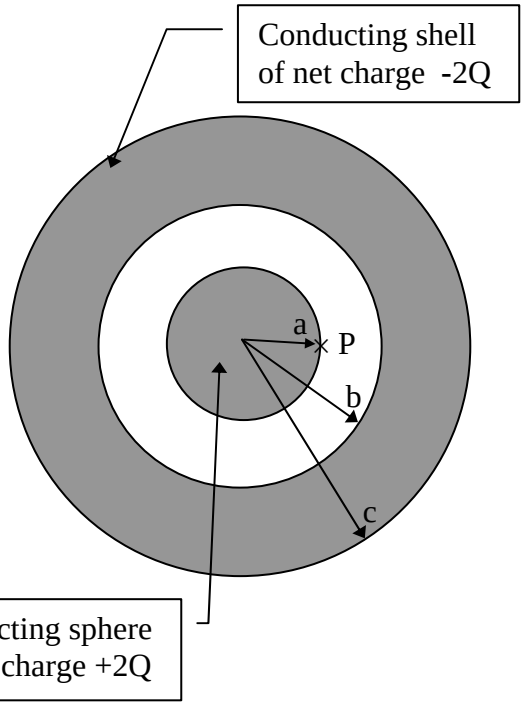
Problem 1

A thin infinite rod carries uniform linear charge density λ lies along the y axis as shown in the figure. Calculate the electric field at point "P".



Problem 2

A solid charged conducting sphere of radius *a* and carries a total charge +2Q is placed inside a charged conducting spherical shell of radii *b* and *c* as shown in the figure. If the conducting shell carries a net charge of -2Q, then:



I- Find the electric field in the following regions:

1- a < r < b
2- b < r < c
3- r > c

II- Find the electric potential at point "p" located on the surface of the conducting inner sphere relative to a point at infinity (Use $V(\infty) = 0$)

III- Find the capacitance of the configuration in terms of a and b.