(1)Q0 A 10 kg piece of ice at 0 degree Celsius is changed slowly
22 Q0 and reversibly to water at 70 degrees Celsius. What is the
Q0 change in entropy of the Ice?
Q0
A1 2.2*10**4 J/K.
A2 -2.2*10**4 J/K.
A3 6.5*10**4 J/K.
A4 -6.5*10**4 J/K.
A5 -3.4*10**4 J/K.
Q0
(2)Q0 What is the coefficient of performance of a refrigerator that
22 Q0 absorbs 40 cal/cycle at low temperature and expels
Q0 51 cal/cycle at high temperature?
Q0
A1 3.6.
A2 0.28.
A3 0.22.
A4 4.6.
A5 2.3.
Q0
(3)Q0 A heat engine absorbs 8.71*10**3 J per cycle from a hot
22 Q0 reservoir with an efficiency of 25% and executes 3.15 cycles
Q0 per second. What is the power output of the heat engine?
Q0
A1 6.86*10**3 W.
A2 1.11*10**5 W.
A3 1.91*10**3 W.
A4 1.58*10**5 W.
A5 3.15*10**3 W.
Q0
(4)Q0 Four electric charges are arranged so that the total electric
23 Q0 field at the origin is zero. Which configuration in figure (1)
Q0 would achieve this?
Q0
A1 Configuration 1.
A2 Configurations 1 and 2.
A3 Configuration 3.
A4 Neither configuration.
A5 All configurations.
Q0
Q0
(5)Q0 A 2.0 micro-C charge is placed at the origin. An identical
23 Q0 charge is placed 2.0 m from the origin on the x-axis, and a
992Q0 third identical charge is placed 2 m from the origin on the
Q0 y-axis. The magnitude of the force on the charge at the
Q0 origin is:
Q0
A1 1.3*10**(-2) N
A2 1.8*10**(-2) N
A3 3.4*10**(-2) N
A4 Zero
A5 2.6*10**(-2) N
Q0
(6)Q0 An electron, traveling with initial velocity 10**5 i m/s,
23 Q0 enters a region of a uniform electric field given by
Q0 E = 4.0*10**3 i N/C. Determine the time it takes for the
Q0 electron to come to rest momentarily.

Q0 (i is a unit vector in the positive x-direction)
Q0
A1 1.4*10**(-10) s.
A2 t=0, i.e. it immediately turns to the negative x-direction.
A3 2.0*10**(-10) s.
A4 It does not come to rest because time would then be negative.
A5 4.0*10**(-10) s.
Q0
(7)Q0 An isolated conducting spherical shell has an inner radius of
24 Q0 4.0 cm and outer radius of 5.0 cm. A charge 8.0*10**(-6) C is
Q0 put on the shell. What is the ratio of the charge on the inner
Q0 surface of the shell to the charge on the outer surface?
Q0
A1 Zero.
A2 1.
A3 5/4.
A4 8/5.
A5 7/10.
Q0
8 Q0 A solid insulating sphere has a charge of 20 micro-C uniformly
24 Q0 distributed throughout its volume. The magnitude of the
991Q0 electric fields inside the sphere at r = 2 cm and outside the
Q0 sphere at r = 10 cm, measured from the center of the sphere,
Q0 are equal. Find the volume charge density of the sphere.
Q0
A1 24 milli-C/m**3.
A2 12 milli-C/m**3.
A3 54 milli-C/m**3.
A4 48 milli-C/m**3.
A5 20 milli-C/m**3.
Q0
(9)Q0 A total charge of 5.00*10**(-6) C is uniformly distributed
24 Q0 inside an irregular insulator. The volume of the insulator is
Q0 2.50 m**3. Now, imagine a cube of volume 0.50 m**3 inside the
Q0 insulator. What is the total electric flux through the surface
Q0 of the cube?
Q0
A1 1.13*10**5 N*m**2/C.
A2 Zero.
A3 2.51*10**6 N*m**2/C.
A4 4.53*10**5 N*m**2/C.
A5 8.10*10**5 N*m**2/C.
Q0
10 Q0 Which one of the following statements is FALSE:
24 Q0
A1 The electric field of a charged conducting sphere is constant
A1 for distances larger than the radius of the sphere.
A2 The flux through a closed surface is proportional to the
A2 charge enclosed by the surface.
A3 The electric field inside a charged conductor in electrostatic
A3 equilibrium is zero.
A4 On irregularly shaped conductor, the charge density is higher
A4 at the sharp edges.
A5 The electric field due to a uniformly charged infinite flat
A5 sheet is independent of distance from the sheet.
Q0
11 Q0 Two point charges Q1 and Q2 are positioned as shown in

```
25 Q0 Figure(2). If Q1 = 2.0*10**(-9) C, Q2 = - 2.0*10**(-9) C,
   Q0 a = 3.0 m, and b = 4.0 m, what is the electric potential
   Q0 difference, VA - VB?
   Q0
   A1  4.8 V
   A2 -8.4 V
   A3  8.4 V
   A4 -6.0 V
   A5 -4.8 V
   Q0
12 Q0 A particle [m = 8.0*10**(-9) kg, q = +6.0*10**(-9) C] has
25 Q0 a speed of 80 m/s at point A and moves to point B where the
   Q0 potential is 2.0*10**3 V greater than at point A. What is the
   Q0 particle's kinetic energy at point B? (Assume that only
   Q0 electric forces act on the particle during its motion.)
   Q0
   A1 14*10**(-6) J.
   A2 38*10**(-6) J.
   A3 10*10**(-6) J.
   A4 28*10**(-6) J.
   A5 40*10**(-6) J.
   Q0
13 Q0 A 2 meters conducting rod is fixed perpendicularly to a
25 Q0 uniform 200 N/C electric field. The potential difference
   Q0 between its ends is:
   Q0
   A1  Zero.
   A2  400 Volts.
   A3 -400 Volts.
   A4  300 Volts.
   A5  150 Volts.
   Q0
14 Q0 Two conducting spheres are very far apart. The smaller sphere
25 Q0 carries a total charge of 6 micro-C. The larger sphere has a
991Q0 radius twice that of the smaller sphere and is neutral
   Q0 (Q = 0). After the two spheres are connected by a thin
   Q0 conducting wire, the charges on the smaller and the larger
   Q0 spheres, respectively are:
   Q0
   A1  2 micro-C  and   4  micro-C.
   A2 -4 micro-C  and  10  micro-C.
   A3  3 micro-C  and   3  micro-C.
   A4  0          and   6  micro-C.
   A5 -6 micro-C  and  12  micro-C.
   Q0
15 Q0 Find the WRONG statement:
26 Q0 When a dielectric materials is inserted between the plates of
   Q0 an isolated capacitor, it will provide the following
   Q0 advantages:
   Q0
   A1 Increase the original charge on the conducting plates.
   A2 Increase the maximum energy that can be stored in the
   A2 capacitor.
   A3 Increase the capacitance of the capacitor.
   A4 Increase the maximum operating voltage of the capacitor.
   A5 Mechanical support between the conducting plates.
   Q0
```

```
   Q0
16 Q0 Consider the combination of capacitors in Fig. (3). The energy
26 Q0 stored in the 5 micro-F capacitor is 0.20 J. The energy stored
   Q0 in 4 micro-F capacitor is:
   Q0
   A1 0.16 J.
   A2 0.20 J.
   A3 0.36 J.
   A4 0.40 J.
   A5 0.04 J.
   Q0
17 Q0 An isolated capacitor, C1 = 20.0 micro-F has a potential
26 Q0 difference of 26.0 V. When an uncharged capacitor C2, of
   Q0 unknown value, is connected across C1, the potential
   Q0 difference becomes 16.0 V for both. What is the value of C2?
   Q0
   A1   12.5*10**(-6) F.
   A2   25.0*10**(-6) F.
   A3   20.0*10**(-6) F.
   A4   1.00*10**(-6) F.
   A5   10.2*10**(-6) F.
   Q0
18 Q0 A parallel plate capacitor of capacitance C has a charge
26 Q0 of magnitude q when connected to a battery of potential
992Q0 difference V. After being fully charged, the capacitor is
   Q0 disconnected from the battery and the separation between
   Q0 the plates is doubled.
   Q0 Which one of the following statements is TRUE?
   Q0
   A1 The voltage across the plates doubles.
   A2 The voltage across the plates is halved.
   A3 The capacitor's capacitance doubles.
   A4 The magnitude of the charge on the plates doubles.
   A5 The magnitude of the charge on the plates is halved.
   Q0
19 Q0 In one hour, how many electrons pass between the terminals
27 Q0 of a 12-V car battery when a 96 watts headlight is used?
991Q0
   A1 1.8*10**23 electrons.
   A2 6.6*10**22 electrons.
   A3 2.6*10**19 electrons.
   A4 2.8*10**23 electrons.
   A5 5.0*10**19 electrons.
   Q0
20 Q0 A resistance operated at 110 Volts has a power output of
27 Q0 100 Watt.  What is the percentage increase of the power if
   Q0 the voltage increase to 121 Volts. (Assume that the resistance
   Q0 stays constant.)
   Q0
   A1  21%.
   A2  25%.
   A3 0.9%.
   A4 3.7%.
   A5  11%.
```

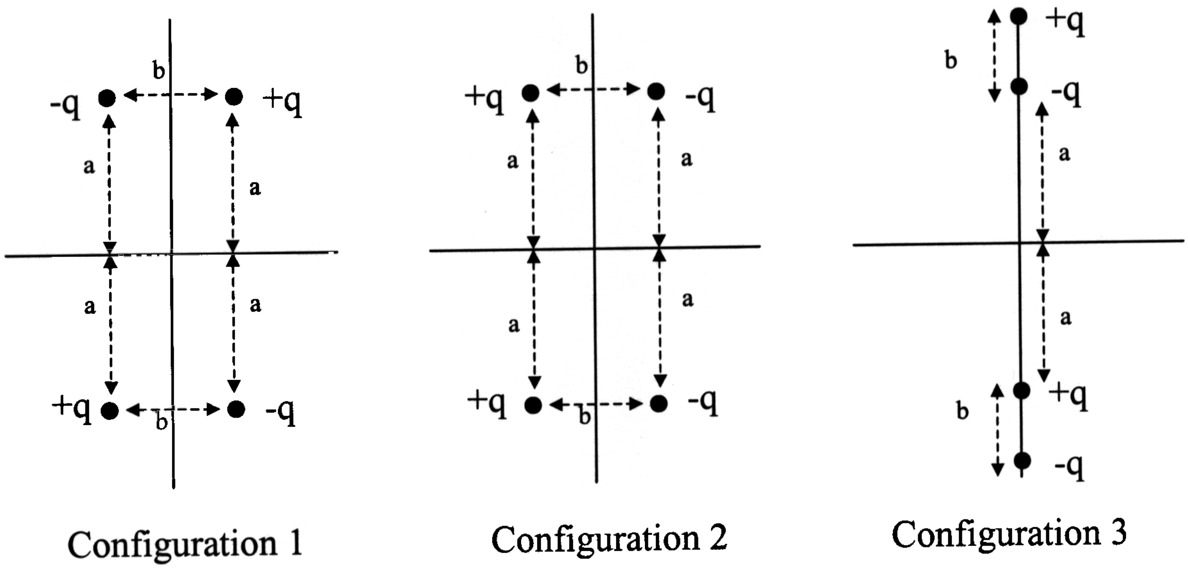

Figure 1

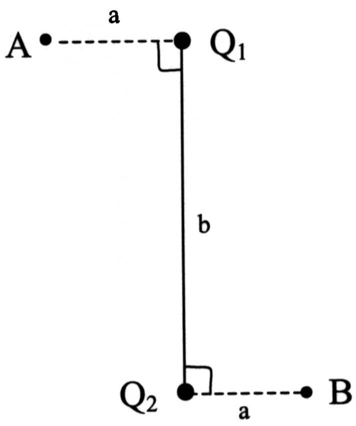

Figure 2

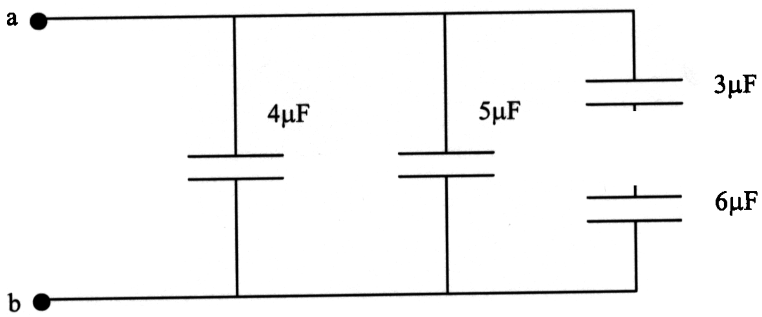

Figure 3