Second Major (T-012)

Q1 Q0 Five moles of an ideal monatomic gas are taken though the cycle
Q0 shown in the Figure (1). Calculate the efficiency of the cycle.
21 Q0
Q0
A1 0.17.
A2 0.28.
A3 0.45.
A4 0.06.
A5 0.83.
Q0
(3)Q0 240 grams of water at 8 degrees-C are cooled to ice at
22 Q0 at - 5 degrees-C. Calculate the change in entropy of the
Q0 water.
Q0 c(ice)=2090 J/kg*K, c(water)=4186 J/kg*K, Lf=3.33*10**(5) J/Kg.
Q0
A1 -331 J/K.
A2 331 J/K.
A3 -254 J/K.
A4 254 J/K.
A5 -172 J/K.
Q0
(4)Q0 Which one of the following statements is WRONG?
22 Q0
A1 The total entropy of a system increases only if it absorbs
A1 heat.
A2 After a system has gone through a reversible cyclic process,
A2 its total entropy does not change.
A3 A refrigerator works like a heat engine in reverse.
A4 Thermal energy cannot be transferred spontaneously from a
A4 cold object to a hot object.
A5 No heat engine has higher efficiency than Carnot efficiency.
Q0
Q4 Q0 Two fixed particles, of charges q1 = + 1.0*10**(-6) C and q2=
012Q0 - 9.0*10**(-6) C, are 10 cm apart. How far from each should
22 Q0 a third charge be located so that no net electrostatic force
Q0 acts on it?
Q0
A1 5 cm from q1 and 15 cm from q2.
A2 3 cm from q1 and 7 cm from q2.
A3 1 cm from q1 and 11 cm from q2.
A4 1 cm from q1 and 9 cm from q2.
A5 1.1 cm from q1 and 11.1 cm form q2.
Q0
Q0 An electric dipole consists of two opposite charges, each
05 Q0 of magnitude 5.0*10**(-19) C, separated by a distance of
23Q0 1.00*10**(-9) m. The dipole is placed in an electric field
Q0 of strength 2.45*10**5 N/C. Calculate the magnitude of the
Q0 torque exerted on the dipole when the dipole moment is
Q0 perpendicular to the electric field.
Q0
A1 1.2*10**(-22) N*m.
A2 2.0*10**(-22) N*m.
A3 3.5*10**(-22) N*m.
A4 - 2.0*10**(-22) N*m.
A5 - 5.2*10**(-19) N*m.
Q0
Q6 Q0 In figure (2), find the magnitude of the electric field at the
012Q0 point R: (0,4) mm due to two-point charges q (1 micro-C) and
23 Q0 - q placed at points A: (-3, 0) mm and B: (3, 0) mm,
Q0 respectively.

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   Q0
   A1   4.3*10**8 N/C.
   A2   7.2*10**8 N/C.
   A3   3.6*10**8 N/C.
   A4   Zero.
   A5   9.0*10**6 N/C.
   Q0
Q7 Q0 Which statement is false:
012Q0
23 A1 Electric field lines extend away from negative charge and
   A1 toward positive charge.
   A2 Electric fields are vector fields.
   A3 The principle of superposition applies to electric fields as
   A3 well as to electrostatic forces.
   A4 The electric dipole consists of two charges of the same
   A4 magnitude but opposite sign.
   A5 When an electric dipole is placed in a uniform electric field,
   A5 the net force on the dipole is zero.
   Q0
Q8 Q0 A point charge of 2.0 micro-C is placed at the center of a cube
012Q0 50 cm on edge.  What is the flux through the bottom surface?
24 Q0
   A1   3.8*10**4 N*m**2/C.
   A2   1.7*10**4 N*m**2/C.
   A3   1.1*10**5 N*m**2/C.
   A4  -5.6*10**4 N*m**2/C.
   A5  -2.8*10**4 N*m**2/C.
   Q0
Q9 Q0 An electron is shot directly toward the center of a large metal
012Q0 plate that has excess negative charge with surface charge density
   Q0 2.0*10**(-6) C/m**2.  If the initial kinetic energy of the
24 Q0 electron is 200 eV and if the electron is to stop just as it
   Q0 reaches the plate, how far from the plate must it be shot?
   Q0
   A1 0.9 mm.
   A2 0.5 mm.
   A3 0.2 mm.
   A4 0.4 mm.
   A5 0.6 mm.
   Q0
Q10Q0 An isolated conductor of arbitrary shape has a net charge of
012Q0 -15*10**(-6) C. Inside the conductor is a cavity within which
24 Q0 is a point charge q=-5.0*10**(-6) C. What is the charge on the
   Q0 cavity-wall, q(in), and what is the charge on the outer surface
   Q0 of the conductor, q(out)?  [See figure (3)].
   Q0
   A1 q(in) = 5.0*10**(-6) C;   q(out) = -20*10**(-6) C.
   A2 q(in) = 5.0*10**(-6) C;   q(out) = -10*10**(-6) C.
   A3 q(in) = 5.0*10**(-6) C;   q(out) = -15*10**(-6) C.
   A4 q(in) =-5.0*10**(-6) C;   q(out) = -15*10**(-6) C.
   A5 q(in) =-5.0*10**(-6) C;   q(out) = -10*10**(-6) C.
   Q0
Q11Q0 What is the external work required to bring four 2.0*10**(-9) C
012Q0 point charges from infinity and to place them at the corner of
25 Q0 a square of side 0.14 m
   Q0
   A1 1.4*10**(-6) Joule.
   A2 1.0*10**(-6) Joule.
   A3 0.3*10**(-6) Joule.
   A4 0.6*10**(-6) Joule.
   A5 1.8*10**(-6) Joule.
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   Q0
Q12Q0 In figure (4), an electron moves from point 'I' to point 'F'
012Q0 in a uniform electric field directed as shown in the figure.
25 Q0
   A1 The electric field does positive work on the electron.
   A2 The electric field does negative work on the electron.
   A3 The electric potential energy of the electron increases.
   A4 The electron moves to a lower potential.
   A5 An external force is required to move the electron from I to F.
   Q0
Q13Q0 In figure (5), a hollow sphere, of radius r that carries a
25 Q0 negative charge -q, is put inside another hollow sphere, of
012Q0 radius R that carries a positive charge Q. At a distance x
   Q0 from the common center, such that r < x < R, the electric
   Q0 potential is:
   Q0
   A1  k*[(Q/R)-(q/x)].
   A2  k*[(Q/R)-(q/r)].
   A3  k*[(Q/R)+(q/x)].
   A4  k*[(Q/R)+(q/r)].
   A5  k*[(Q/x)-(q/R)].
   Q0
Q14Q0 In figure (6), Q1 = 2.0*10**(-6) C and Q2 = - 2.0*10**(-6) C.
012Q0 What is the external work needed to move a charge
25 Q0 Q = - 4.0*10**(-6) C at constant speed from point A at the
   Q0 center of the square to point B at the corner?
   Q0
   A1   Zero.
   A2   5.1*10**(-6) Joule.
   A3   7.2*10**(-6) Joule.
   A4 - 5.1*10**(-6) Joule.
   A5 - 7.2*10**(-6) Joule.
   Q0
Q15Q0 A parallel-plate capacitor has a plate area of 0.2 m**2 and
012Q0 a plate separation of 0.1 mm. If the charge on each plate has
 26Q0 a magnitude of 4.0*10**(-6) C the electric field between the
   Q0 plates is approximately:
   Q0
   A1  2.3*10**6 V/m.
   A2  4.2*10**6 V/m.
   A3  1.4*10**4 V/m.
   A4  9.2*10**3 V/m.
   A5  Zero.
   Q0
Q16Q0 A 2 micro-F and a 1 micro-F capacitor are connected in series
012Q0 and a potential difference is applied across the combination.
 26Q0 The 2 micro-F capacitor has:
   Q0
   A1 half the potential difference of the 1 micro-F capacitor.
   A2 twice the charge of the 1 micro-F capacitor.
   A3 half the charge of the 1 micro-F capacitor.
   A4 twice the potential difference of the 1 micro-F capacitor.
   A5 zero of stored energy.
   Q0
Q17Q0 Capacitors A and B are identical. Capacitor A is charged so
012Q0 it stores 4 J of energy and capacitor B is uncharged. The
26 Q0 capacitors are then connected in parallel. The total stored
   Q0 energy in the capacitors is now:
   Q0
   A1   2 Joules.
   A2  16 Joules.
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   A3   8 Joules.
   A4   1 Joules.
   A5   4 Joules.
   Q0
Q18Q0 A copper wire "1" has a length L1 and diameter d1. Another
27 Q0 copper wire "2" has a length L2 and diameter d2. At constant
012Q0 temperature, the second conductor has smaller resistance if:
   Q0
   A1 d2 > d1 and L2 < L1.
   A2 d2 = d1 and L2 > L1.
   A3 d2 < d1 and L2 < L1.
   A4 d2 < d1 and L2 = L1.
   A5 d2 > d1 and L2 > L1.
   Q0
Q19Q0 If 4.7*10**(16) electrons pass a particular point in a wire
012Q0 every minute, what is the current in the wire?
27 Q0
   A1   1.3*10**(-4) A.
   A2   4.7*10**(-3) A.
   A3   2.9*10**(-5) A.
   A4   2.9*10**(-3) A.
   A5   9.1*10**(-3) A.
   Q0
Q20Q0 An electric device, which heats water by immersing a
27 Q0 resistance wire in the water, generates 153 J of heat per
992Q0 second when an electric potential difference of 12 V is
   Q0 placed across its ends. What is the resistance of the
   Q0 heater wire?
   Q0
   A1 0.94 Ohms
   A2 0.81 Ohms
   A3 0.58 Ohms
   A4 0.48 Ohms
   A5 2.10 Ohms
   Q0
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