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| **Assiut University** | | **Term: 2018 - 2019** |
| **Faculty of Science** | | **Date:** May $21^{th}$, 2019 |
| **Physics Department** | | **Time:** 2 hours |

**Course Name:** General Physics (1) **100 P (50%)** **Coordinator:** Dr. Alaa Abd-Elnaiem

**Question (I): In the following multiple choice questions, please choose the correct answer, you must write down the steps to get the correct answer.** **(25 Marks)**

(1) During a short interval of time, the speed $v$ in m/s of an automobile is given by $v=at^2+bt^3$, where the time $t$ is in seconds. The units of $a$ and $b$ are respectively:

a. $m/s^4$ ; $m/s^5$ b. $m/s^3$ ; $m/s^4$ c. $m/s^2$ ; $m/s^3$ d. $s^3/m$ ; $s^4/m$

(2) The side of an iron cube is $6\times10^{-6}$ cm long. If the density is 7.86 g/cm$^3$, the mass of the cube, in **SI units**, is approximately:

a. $2.75\times10^{-20}$ b. $1.7\times10^{-18}$ c. $3.64\times10^{-18}$ d. $3.64\times10^{19}$

(3) At what temperature is the Celsius scale reading equal to twice the Fahrenheit scale reading?

a. −12.3°F b. −24.6°F c. −12.3°C d. −24.6°C

(4) A 0.05 kg ingot of metal is heated to 200 °C and then dropped into a calorimeter containing 0.4 kg of water initially at 20 °C. If the final equilibrium temperature of the mixed system is 22.4 °C, the specific heat of the metal is ($S_{water}$=4187 J/Kg.°C):

a. 150 J/Kg.°C b. 453 J/Kg.°C c. 673 J/Kg.°C d. 800 J/Kg.°C

(5) A constant-volume gas thermometer is used to measure the temperature of an object. When the thermometer is in contact with water at its triple point (273.16 K) the pressure in the thermometer is $8.5\times10^4$ Pa. When it is in contact with the object the pressure is $9.65\times10^4$ Pa. The temperature of the object is:

a. 37 K b. 241 K c. 310 K d. 314 K

(6) Suppose that **X=YZ**, where **X** has the dimension **L/M** and **Z** has the dimension **L/T**, then **Y** has the dimension:

a. $M/L^2T$ b. T/M c. $TM/L^2$ d. $L^2/TM$

(7) The Cartesian coordinates of a point in the $xy$ plane are $(x, y) = (-3.5, -2.5)$ m, the polar coordinates of this point $(r, \theta)$ are:

a. (2.3 m, 36°) b. (3.6 m, 95°) c. (4.3 m, 216°) d. (−2.9 m, 25°)

(8) The standard kilogram is a Platinum-Iridium cylinder 39 mm in height and 39 mm in diameter. What is the density of this material?

a. 21.455 g/cm$^3$ b. 5.362 g/cm$^3$ c. 10.59 g/cm$^3$ d. 9.5 kg/m$^3$

(9) A house is built of bricks (**k** = 0.15 cal/(sec. m.°C)), with walls 20 cm thick. A wall in one of the rooms of this house measures 5 m × 3 m. What is the heat flow through this wall if the inside temperature is (21 °C) and the outside temperature (−18 °C)?

a. 150 cal/sec b. 240 cal/sec c. 440 cal/sec d. 680 cal/sec

(10) A jet lands on an aircraft carrier at 63 m/s, what is its acceleration (assumed constant) if it stops in 2 s due to an arresting cable that snags the jet and brings it to a stop?

a. ~ −32 m/s$^2$ b. ~ −120 m/s$^2$ c. ~ 32 m/s$^2$ d. ~ 120 m/s$^2$

**Question (II): Answer the following problems** **(25 Marks)**

1. A solid cube of Al (density 2.7 g/cm$^3$) has a volume of 0.2 cm$^3$. If the atomic mass of Al is 27 g/mol, how many Al atoms are contained in the cube? [$N_A$=6.02×10$^{23}$ atoms/mol]

2. Suppose we are told that the acceleration ($a$) of a particle moving with uniform speed ($v$) in a circle of radius ($r$) is proportional to some power of $r$, say $r^n$, and some power of $v$, say $v^m$. Determine the values of $n$ and $m$? [Use dimension analysis method]

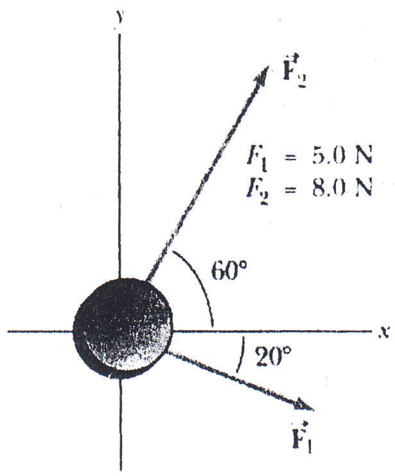
3. An aluminum-alloy rod has a length of 10 cm at 20°C and a length of 10.015 cm at the boiling point of water.

   **a)** What is the length of the rod at the freezing point of water?
   **b)** What is the temperature if the length of the rod is 10.009 cm?

4. A long jumper leaves the ground at an angle of 20° above the horizontal and at a speed of 11 m/s [g=9.8 m/s$^2$].

   **a)** How far does he jump in the horizontal direction?
   **b)** What is the maximum height reached?

5. A hockey puck having a mass of 0.3 kg slides on the horizontal, frictionless surface of an ice rink. Two hockey sticks strike the puck simultaneously, exerting the forces on the puck shown in Figure. The force $\vec{F}_1$ has a magnitude of 5 N, and the force $\vec{F}_2$ has a magnitude of 8 N. Determine both the magnitude and the direction of the puck's acceleration.




<<<BEST WISHES>>>

امتحان مقرر حقوق الانسان

كلية العلوم

دور مايو ٢٠١٩م

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## أجب عن سؤالين فقط من الاسئلة التالية:

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السؤال الأول :تكلم عن مظاهر اقامة العدالة بين الناس ؟

السؤال الثاني: اشرح انواع حقوق الانسان؟

السؤال الثالث : تكلم عن العهد الدولي للحقوق المدنية والسياسية؟

ـــــــ انتهت الأسئلة مع تمنياتنا بالنجاح والتفوق - ـــــــ

| Assuit University<br>Faculty of Science<br>Department of Physics | | Second Semester 2018 - 2019<br>Date: 21 / 5 / 2019<br>Time: 2 hours |
|---|---|---|
| Course Title: General Physics (2) – Code: P105 – Final Exam (50%) | | |

**Part I- Choose the correct answer:** **(18 Marks)**

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1) To make an uncharged object have a positive charge:

a) remove some neutrons

b) add some neutrons

c) add some electrons

d) remove some electrons

2) The unit of $1/4\pi\epsilon_0$ is:

a) $N^2C^2$

b) $N \cdot m/C$

c) $N^2 \cdot m^2/C^2$

d) $N \cdot m^2/C^2$

3) An isolated charged point particle produces an electric field with magnitude $E$ at a point 2m away. At a point 1m from the particle the magnitude of the field is:

a) $2E$

b) $4E$

c) $E/2$

d) $E/4$

4) An electron traveling north enters a region where the electric field is uniform and points north. The electron:

a) speeds up

b) slows down

c) turns east

d) continues with the same speed in the same direction

5) The net charge on the outer surface of a spherical conducting shell is +7C. A particle with a charge of −3 C is placed at the center of the cavity. The net charge of the spherical conducting shell is:

a) +10C

b) −7C

c) +4C

d) -10C

6) A total charge of $7\times10^{-8}$ C is uniformly distributed throughout a non-conducting sphere with a radius of 5 cm. The electric potential at the surface, relative to the potential far away, is about: ($k_e = 9\text{x}10^9$ N.m$^2$/C$^2$)

a) $1.26 \times 10^4$ V

b) $-1.32 \times 10^4$ V

c) $7.54 \times 10^5$ V

d) $-6.32 \times 10^4$ V

7) A 5 cm radius isolated conducting sphere is charged so its potential is +100V, relative to the potential far away. The charge density on its surface is:

a) $+2.27 \times 10^{-8}$ C/m$^2$

b) $-2.27 \times 10^{-8}$ C/m$^2$

c) $+1.77 \times 10^{-8}$ C/m$^2$

d) $+3.55 \times 10^{-8}$ C/m$^2$

8) If a capacitor $C$ has a charge $Q$, then the actual charges on its plates are:

a) $Q$, $Q$

b) $Q/2$, $Q/2$

c) $Q$, $-Q$

d) $Q/2$, $-Q/2$

9) To store a total of 0.04 J of energy in the two identical capacitors connected in parallel with a battery of 200 V, each should have a capacitance of:

a) 1.0 μF

b) 2.0 μF

c) 0.10 μF

d) 1.5 μF

10) Four wires meet at a junction. The first carries 4A into the junction, the second carries 5A out of the junction, and the third carries 2A out of the junction. The fourth carries:

a) 7A out of the junction

b) 3A into the junction

c) 3A out of the junction

d) 7A into the junction

11) A total resistance of 3 Ω is to be produced by combining an unknown resistor $R$ with a 12 Ω resistor. The value of $R$ and how is it to be connected to the 12 Ω resistor is:

a) 2.4 Ω, parallel

b) 4.0 Ω, series

c) 4.0 Ω, parallel

d) 2.4 Ω, series

12) In the formula $\vec{F} = q\vec{v}x\vec{B}$:

a) $\vec{F}$ must be perpendicular to $\vec{v}$ but not necessarily to $\vec{B}$

b) $\vec{F}$ must be perpendicular to $\vec{B}$ but not necessarily to $\vec{v}$

c) $\vec{v}$ must be perpendicular to $\vec{B}$ but not necessarily to $\vec{F}$

d) $\vec{F}$ must be perpendicular to both $\vec{v}$ and $\vec{B}$

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**Part II- Solve only four (4) from the following problems: (32 Marks)**

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1) A long conductor, straight metal rod has a radius of 5 cm and a charge per unit length of 30 nC/m. Find the electric field (a) 3 cm, (b) 10 cm, and (c) 100 cm from the axis of the rod, where distances are measured perpendicular to the rod's axis. ($k_e = 9\text{x}10^9$ N.m$^2$/C$^2$)

2) A charge $+q$ is at the origin. A charge $-2q$ is at $x = 2$ m on the $x$-axis. For what finite value(s) of $x$ is (a) the electric field zero? (b) The electric potential zero?

3) Two capacitors ($C_1 = 5\ \mu F$ and $C_2 = 12\ \mu F$), are connected with a battery of 9 V. Find:

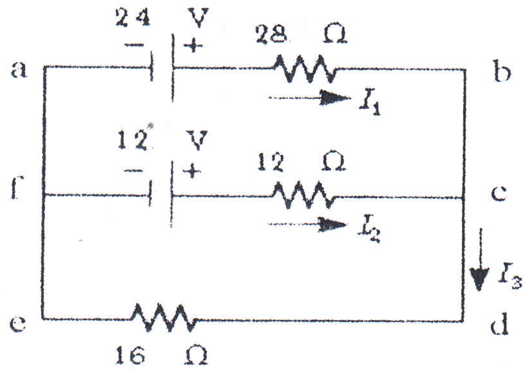
(a) The equivalent capacitance of the combination.

(b) The potential difference across each capacitor.

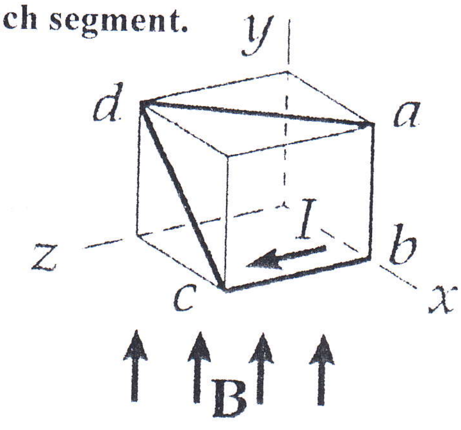
(c) The charge stored on each capacitor.

In case of the two capacitors are connected in parallel and in series with the battery.

4) **Using Kirchhoff's rules, find the current in each resistor in the figure.**



5) As shown in the figure, the cube is 40 cm on each edge. Four straight segments of wire named as: *ab*, *bc*, *cd* and *da* form a closed loop that carries a current $I = 5$ A, in the direction shown. A uniform magnetic field of magnitude $B = 0.02$ T is in the positive $y$ direction. Determine the magnitude and direction of the magnetic force on each segment.



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