Assiut University **Faculty of Science** **Physics Department** **Final Exam: 50 Marks**		**Semester: Spring 2019** **Date: 26/5/2019** **Course: Electricity & AC current (P226)** **Time Allowed: 2 hours**

Constants: $\mu_0 = 4\pi \times 10^{-7}$ T.m/A

Question I: **(20 Marks, 2 per each)**

Circle the correct answer for all of the following TEN multiple-choice questions.

1. In an *RC* circuit, when the switch is closed, the response ____

(a) do not vary with time
(b) decays with time
(c) rises with time
(d) first increases and then decreases

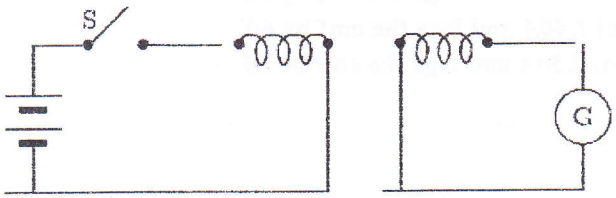
2. A capacitor is charged up to ***18 volts***, and then connected across a resistor. After ***10 seconds***, the capacitor voltage has fallen to ***12 volts***. What will the voltage be after another ***10 seconds*** (***20 seconds*** total)?

(a) 0 V **(b) 6 V** **(c) 8 V** **(d) 10 V**

3. A long narrow solenoid has length ℓ and a total of N turns, each of which has cross-sectional area A. Its inductance is:

(a) $\mu_0 N^2 A\, \ell$ **(b)** $\mu_0 N^2 A / \ell$ **(c)** $\mu_0 NA / \ell$ **(d)** $\mu_0 N^2 \ell / A$

4. In the experiment shown:



(a) there is a steady reading in *G* as long as *S* is closed
(b) the current in the battery goes through *G*
(c) there is a current in *G* just after *S* is opened or closed
(d) since the two loops are not connected, the current in *G* is always zero

5. A **6.0 mH** inductor and a **3.0 Ω** resistor are wired in series to a **12 V** ideal battery. A switch in the circuit is closed at time **0**, at which time the current is zero. **2.0 ms** later the energy stored in the inductor is:

(a) $0\ J$ **(b)** $2.5 \times 10^{-2}\ J$ **(c)** $9.6 \times 10^{-3}\ J$ **(d)** $1.9 \times 10^{-2}\ J$

6. A charged capacitor and an inductor are connected in series. At time $t = 0$ the current is zero, but the capacitor is charged. If T is the period of the resulting oscillations, the next time after $t = 0$ that the energy stored in the magnetic field of the inductor is a **maximum** is:

(a) T (b) $2T$ (c) $T/2$ (d) $T/4$

7. The electrical analog of a **spring constant** k is:

(a) $1/C$ (b) C (c) $1/L$ (d) R

8. In a **purely inductive** circuit the current:

(a) lags the voltage by one-fourth of a cycle
(b) lags the voltage by one-half of a cycle
(c) leads the voltage by one-fourth of a cycle
(d) leads the voltage by one-half of a cycle

9. In an ***RLC*** series circuit, the source voltage is leading the current at a given frequency f. If f is lowered slightly, then the circuit **impedance** will:

(a) increase **(b) decrease**
(c) remain the same **(d) need to know the amplitude of the source voltage**

10. An **ac** generator produces ***10V (rms)*** at ***400 rad/s***. It is connected to a series ***RL*** circuit ($R = 17.3\ \Omega$, $L = 0.025\ H$). The **rms current** is:

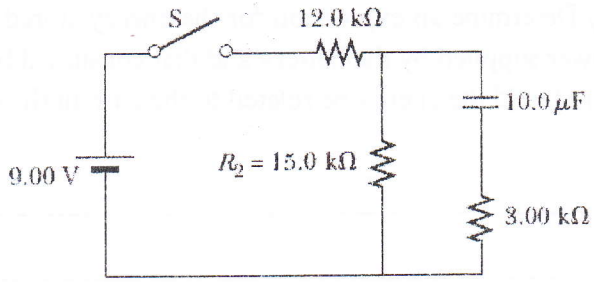
(a) $0.50A$ **and leads the emf by 30°**
(b) $0.71A$ **and lags the emf by 30°**
(c) $1.40A$ **and lags the emf by 60°**
(d) $0.50A$ **and lags the emf by 30°**

Question II: **(30 Marks, 7.5 per each)**

Solve only FOUR of the following FIVE problems.

Problem 1

Consider the **RC** circuit shown in the figure. Suppose that the switch ***S*** has been closed for a length of time sufficiently long enough for the capacitor to be fully charged.
Find:



(a) the steady-state current in each resistor.
(b) the charge **Q** on the capacitor.
(c) the time that it takes for the charge on the capacitor to fall to **one-fifth** its initial value.

Problem 2

You know that the power supplied by a battery is given by $P = V I$ (the battery voltage times the current it is supplying). You also know that a resistor dissipates power (turns it into heat) at a rate given by $P = I^2 R$.

Consider a simple RC circuit (battery, resistor R, capacitor C).
(a) Determine an expression for the energy stored in the capacitor by integrating the difference between the power supplied by the battery and that consumed by the resistor.
(b) Should the energy be related to the current through the capacitor or the potential across it?

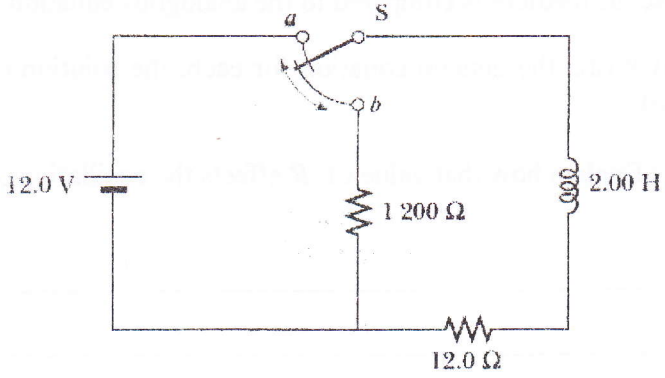
Problem 3

One application of an ***RL*** circuit is the generation of timevarying high voltage from a low-voltage source, as shown in the figure.

(a) What is the current in the circuit a long time after the switch has been in position *a*?

(b) Now the switch is thrown quickly from *a* to *b*. Compute the initial voltage across each resistor and across the inductor.

(c) How much time elapses before the voltage across the inductor drops to *12.0 V*?



Problem 4

The equation of motion for a mechanical system comprised of a mass at the end of a string and vibrating in a viscous medium is compared to the analogous equation for an electrical system consisting of an ***RLC*** circuit.

(a) Write: the general equation for each, the solution of these equations, and the angular frequency ω_d for each.

(b) Explain how that value of R affects the oscillation of ***RLC*** circuit (draw Q versus t for each case).

Problem 5

A series ***RLC*** circuit has components with following values:
$L = 200\ mH$, $C = 10\ \mu F$, $R = 20\ \Omega$, and $\Delta V_{max} = 100\ V$, with $\Delta v = \Delta V_{max} \sin 377\ t$.
Find:

(a) Determine the inductive reactance, the capacitive reactance, and the impedance of the circuit.
(b) Find the maximum current in the circuit.
(c) Find the phase angle between the current and voltage.

End of the Exam.....*Good Luck*

Dr. Samar Moustafa

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Assiut University
Faculty of Science
Department of Physics
Second semester 2018-2019

Course: Modern Physics
Code: P225
Time: 2 Hour
Final Exam (50%)

Answer the following FIVE questions:

Question (1): (10 Marks)

a- A man on the earth measures an event at a point 7.00 m from him at a time of 5.0 s. If a rocket ship flies over the man at a speed of $0.9c$, what coordinates does the astronaut in the rocket ship attribute to this event? (5 Marks)

b- Type Bohr's hypotheses for his atomic model. Using these assumptions, estimate the radius of the stable hydrogen atom. (5 Marks)

Question (2): (10 Marks)

a- Derive the length contraction relation. (5 Marks)

b- X-rays of wavelength $\lambda = 2$ Å are aimed at a block of carbon. The scattered x-rays are observed at an angle of 45° to the incident beam. Calculate the increased wavelength of the scattered x-rays at this angle. (5 Marks)

Question (3): (10 Marks)

a- The work function for lithium metal is 2.93 eV.
   i- What the smallest frequency of light is needed to produce electrons of kinetic energy 3.00 eV from illumination of lithium?
   ii- What is the stopping potential in this case?
   iii- What is the velocity of faster electron? (5 Marks)

b) When Lorentz transformations are reduced to the Galilean transformations? Prove that. (5 Marks)

Question (4): (10 Marks)

a- A furnace has walls of temperature 1600°C. What is the wavelength of maximum intensity emitted when a small door is opened? (5 Marks)

b- Determine the longest and shortest wavelengths observed in the Paschen series for hydrogen. (5 Marks)

Follow ⟶

Question (5): **(10 Mark)**

a- In the electron diffraction experiment an electron of charge e and mass m is accelerated from rest through a potential difference $V = 50\ volt$. Find its de Broglie wavelength, assuming that the electron is nonrelativistic. **(5 Marks)**

b- An observer in frame S sees lightning simultaneously strike two points 100 m apart. The first strike occurs at $x_1 = y_1 = z_1 = t_1 = 0$ and the second at $x_2 = 100\ m$, $y_2 = z_2 = t_2 = 0$:

(i) What are the coordinates of these two events in a frame S' moving in the standard configuration at $0.70c$ relative to S?

(ii) How far apart are the events in S'?

(iii) Are the events simultaneous in S'? If not, what is the difference in time between the events, and which event occurs first? **(5 Marks)**

Electron chaege e	1.6×10^{-19}C	Plank's constant h	6.626×10^{-34} Joul.sec
Electron mass m_e	9.1×10^{-31}kg	Light velocity c	3×10^{8} m.sec^{-1}
Proton mass m_p	1.672×10^{-27} kg	Coulomb constant k	9×10^{9}J.m.C^{-2}
Wien's displacement constant a	2.8977×10^{-3} m·K	Ionization energy of the hydrogen atom E_o	13.6 eV
Rydberg constant R_∞	1.097×10^{7} m^{-1}		

WITH MY BEST WISHES

Hesham Al-Attar

Assiut University **Faculty of Science** **Physics Department**		**Final Exam 2019** **Date:** June 9th, 2019 **Allowed time:** 3 hours

Course Name: ***Introduction to Physics of Metals, Alloys and Ceramics*** **Course Code:** P256

Coordinator: Dr. Alaa Abd-Elnaiem

Answer all the following questions

Question (I): In the following multiple choice questions, please circle the correct answer(s). You must write down the steps to get the correct answer (for MCQ: 6 to 8) **(12 Marks)**

1. Above the following line, liquid phase exist for all compositions in a phase diagram:

   A. Tie-line. **B.** Solvus. **C.** Solidus. **D.** Liquidus. **E.** None of these.

2. Coordination number in hexagonal crystal structure:

   A. 2. **B.** 4. **C.** 6. **D.** 8. **E.** 12.

3. Thermodynamically stable defects:

   A. Point defects. **B.** Line defects. **C.** Surface defects. **D.** Volume defects. **E.** Twin boundary.

4. A solid + a liquid result in a liquid up on heating during ..... reaction.

   A. Eutectic **B.** Peritectic **C.** Monotectic **D.** Syntectic **E.** None of these

5. Following is not the 2-dimensional imperfection:

   A. Dislocation. **B.** Precipitates. **C.** Surface defects. **D.** Grain boundary. **E.** Twin boundary.

6. Ir has an FCC crystal structure, a density of 22.4 g/cm^3, and an atomic weight of 192.2 g/mol, then the radius of an iridium atom equal?

   A. 0.553 nm **B.** 0.439 nm **C.** 0.363 nm **D.** 0.211 nm **E.** 0.136 nm

7. Miller indices for the indicated plane, **Figure 1**, is :

   A. (001) **B.** (110) **C.** (101) **D.** $(\bar{1}01)$ **E.** $(0\bar{1}1)$

8. A specimen of aluminum having a rectangular cross-section 10 mm×12.7 mm is pulled in tension with 3.55×10^4 N force, producing only elastic deformation. If the elastic modulus for Al is 69×10^9 N/m^2, the resulting strain is:

   A. 6.2×10^{-4} **B.** 4.1×10^{-3} **C.** 7.5×10^{-2} **D.** 1.3×10^{-2} **E.** 0.154

Question (II): Answer the following problems **(18 Marks)**

1. Titanium (Ti) has an HCP unit cell for which the ratio of the lattice parameters c/a is 1.58. If the radius of the Ti atom is 0.1445 nm, (a) determine the unit cell volume, and (b) calculate the density of Ti and compare it with the literature value (4.51 g/cm^3). [Hint: A_{Ti}= 47.87 g/mol]
2. Gold (Au) forms a substitutional solid solution with silver (Ag). Compute the number of gold atoms per cubic centimeter for a silver-gold alloy that contains 10 wt% Au and 90 wt% Ag. The densities of pure gold and silver are 19.32 and 10.49 g/cm^3, respectively. [Hint: A_{Au}= 196.97 g/mol; A_{Ag} = 107.9 g/mol]
3. Determine the expected diffraction angle for the first-order reflection from the (113) set of planes for FCC platinum, has an atomic radius of 0.1387 nm, when monochromatic radiation of wavelength 0.1542 nm is used.
4. Silver and palladium (Pd) both have the FCC crystal structure and Pd forms a substitutional solid solution for all concentrations at room temperature. Compute the unit cell edge length for a 75 wt% Ag–25 wt% Pd alloy. The room-temperature density of Pd is 12.02 g/cm^3, and its atomic weight and atomic radius are 106.4 g/mol and 0.138 nm, respectively.

5. Methylene chloride is a common ingredient of paint removers. Besides being an irritant, it also may be absorbed through the skin. When using this paint remover, protective gloves should be worn. If butyl rubber gloves (0.04 cm thick) are used, (a) what is the diffusive flux of methylene chloride through the glove? (b) what is the critical thickness of gloves required to prevent the skin? [Hint: diffusion coefficient in butyl rubber: $D = 11\times10^{-7}$ cm^2/s; surface concentrations: $C_1 = 0.44 g/cm^3$ & $C_2 = 0.02 g/cm^3$]
6. A piece of copper (Cu) originally 305 mm long is towed in tension with a stress of 276 MPa. If the deformation is entirely elastic, what will be the resultant elongation? (Hint: Elastic modulus for Cu is 110 GPa)

Question (III): **(8 Marks)**

1. For a 40 wt% Sn-60 wt% Pb alloy at 150°C, *in below phase diagram* **(Figure 2)**:
   (a) What phase(s) is (are) present?
   (b) What is (are) the composition(s) of the phase(s)?
   (c) Calculate the relative amount of each phase present in terms of a mass fraction?
   (d) State eutectic reaction, temperature, and composition of this system.
   (e) Investigate in details the microstructure for slow and fast cooling from 300 °C to 100 °C for this composition.
2. Describe in details the phase diagram shown in **Figure 2** and state the different equilibrium lines.

Question (IV): **(12 Marks)**

1. What is meant by solid solution and what is the type of solid solution (explain with drawing)? And what is the condition for complete soluble metal A in metal B in the solid state?
2. What are the steps to prepare sample for testing microscopy
3. Determine the Miller indices for planes A, B and C in **Figure 3** and draw [002], and [130] directions in the cubic system.
4. What is the basic difference between Vickers hardness test and Rockwell hardness test?

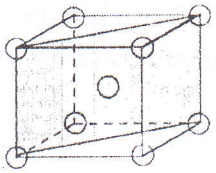

Figure 1

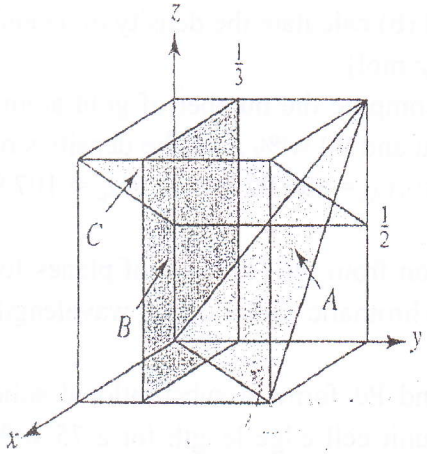

Figure 3

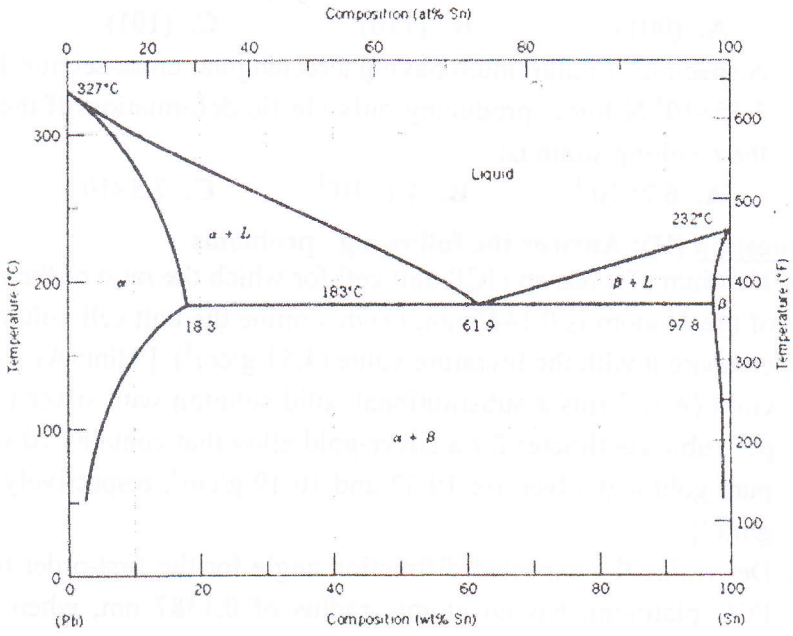

Figure 2

BEST WISHES,,,

كلية العلوم- قسم افيزياء

جامعة اسيوط

Final Exam. In "Physics of Vibrations & Waves" (212 P)

May , 2019

Time: 3 hours

Answer only five questions:

1. a) Discuss the physical significance of the restoring force of the following oscillations:(i) Vibration of a liquid in U-tube. (ii) Vibration of a mass tied at the middle of tense string.

b) Prove that the refractive index of the scattered medium: $\mu_S = (\mu - \lambda S)$, explain the physical meaning of the false scattering, Determine the condition that the group, and non-scattered velocities are equal.

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2 .a) According to the general vibration eqn.: $\omega_S = \omega_0^2 [1 - \cos(s\pi / n+1)]$, where $\omega_0^2 = 2T / m\ell$, study the vibration of a five symmetric masses connected together. Discuss the resulting values.

b) Express the displacement eqns. of transversal wave due to the effect of a vertical periodic force acts on certain position ($x = 0$) of tense string, determine the reflection and transmission factors, and the totally reflection condition.

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3 .a) Let: $x = A\sin(\omega t - \delta)$ represents the general displacement of the forced damped oscillation, prove that the eqn. of the current flowing through the LRC- circuit have the same empirical form as: $I = A' \sin(\omega t - \theta)$.

b) Use the wave displacement: $y = A\cos(\omega t - kx)$ to find an expression of the refractive index in the absorbed medium.

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4 .a) Determine the parameters on which the following energies depend: (i) the loss energy through light damped medium, (ii) The gained potential energy of an element (dS) of tense string during the propagation of transversal wave.

b) A mass of (*2 Kg*) apart a distance (*20 cm*) from its stationary position in x-axis, if the mass moving under applying force (*8x*) in its original position, (i) find the eqn. of motion and the periodic time, (ii) express the velocity at time (t).

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5 .a) Compare between: (i) the mechanical and electrical parameters of the forced damped oscillation, (ii) the behavior of the wave motion amplitude through an absorbed and damped medium.

b) A simple pendulum with length (*1m*) vibrates around the vertical direction by angle (30^0), determine the velocity at the lowest during its vibration path and explain the physical significance.

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6 .a) Express the eqn. of motion of two vibrating symmetric masses connected together, if their displacement: $x_1 = A\sin\omega_0 t$, and $x_2 = B\sin\omega_0 t$, find the frequency of each mass then determine the path difference between the motion of the masses.

b) Explain an electrical method used for producing the ultrasound waves.

تمنياتي بالتوفيق والتفوق .....أ.د. عبد المنعم سلطان

انتهت الأسئلة

Assiut University

Faculty of Science

Date: 27/5/2019
Time: 3 hours

Final Exam: Modern Physics
Code:215P

Physics Department

Note: Given choices may be approximated

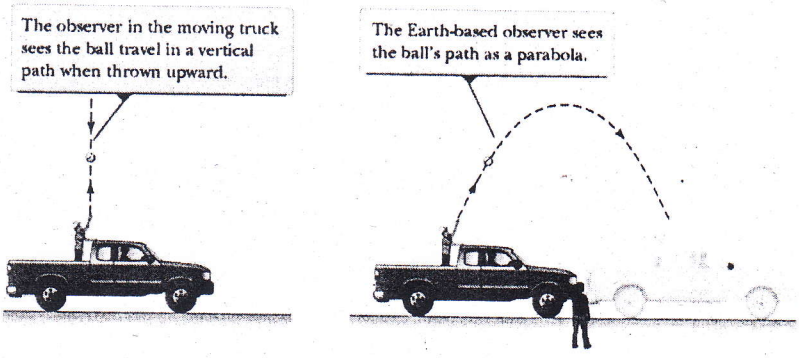
First Question (Choose the most accurate answer) (20 Marks)

Tabulate your answer in your exam booklet as the shown table

No.	1	2	3	4	5	6	7	8	9	10
Answer	---	---	---	---	---	---	---	---	---	---

1. The experiment that dispelled the idea that light travels in the ether is called the:
   (a) Michelson-Morley experiment.
   (b) Hafele and Keating experiment.
   (c) Fitzgerald-Kennedy experiment.
   (d) twin paradox.
2. The Michelson-Morley experiment was designed to make use of ..... to find the motion of the Earth relative to the luminiferous ether.
   (a) sound waves
   (b) interference fringes
   (c) electromagnetic wind
   (d) none of the above
3. According to a postulate of Einstein, which of the following describes the nature of the laws of physics as one observes processes taking place in various inertial frames of reference?
   (a) Laws are same only in inertial frames with zero velocity.
   (b) Laws are same only in inertial frames moving at low velocities.
   (c) Laws are same only in inertial frames moving at near speed of light.
   (d) Laws are same in all inertial frames.
4. I am stationary in a reference system but if my reference system is not an inertial reference system, then, relative to me, a system that is an inertial reference system must:
   (a) remain at rest.
   (b) move with constant velocity.
   (c) be accelerating.
   (d) be none of the above.
5. The speed of light is equal to:
   (a) 5.28×10^7 miles per hour.
   (b) one meter per nanosecond.
   (c) one light-year per year.
   (d) none of the above.

6. The relativistic effect of time dilation has been verified by which of the following?
   (a) the discovery of black holes
   (b) muon experiments
   (c) twin experiments
   (d) red shift in distant galaxies
7. The total energy of a particle:
   (a) is not related to its relativistic momentum.
   (b) increases with increasing relativistic momentum.
   (c) decreases with increasing relativistic momentum.
   (d) is a constant.
8. Relativity dealing with gravitation is known as:
   (a) Inertial relativity
   (b) Gravitational relativity
   (c) Galilean relativity
   (d) General relativity
9. The branch of physics, that deals and explains the laws of very small and very fast particles, is
   (a) Classical physics
   (b) Quantum mechanics
   (c) Relativistic mechanics
   (d) Relativistic quantum mechanics
10. Which observer in Figure sees the ball's correct path?



   (a) the observer in the truck
   (b) the observer on the ground
   (c) both observers
   (d) none of them

Second Question (10 Marks)

Part A (5 Marks)

Write both the Galilean and Lorentz transformation equations of position (x, y, and z) and time (t) for an object in an inertial rest frame S with respect to inertial frame S' moves with constant velocity v in the x-x' direction.

Part B (5 Marks)

Derive the Lorentz velocity transformation equations for an object in an inertial rest frame S with respect to inertial frame S' moves with constant velocity v in the x-x' direction.

Answer ONLY ONE of the following questions

Third Question (20 Marks)

Part A (10 Marks)

Derive the length contraction equation of observers measure a meter stick placed along the x-axis in an inertial rest frame S with respect to inertial frame S' moves with constant velocity v in the x-x' direction.

Part B (choose the most accurate answer) (6 Marks)

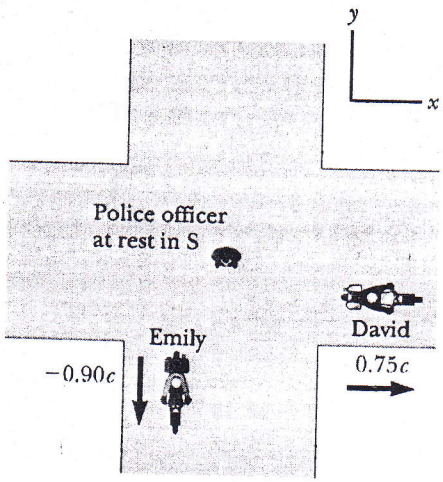
Tabulate your answer in your exam booklet as the shown table

No.	1	2	3
Answer	---	---	---

1. The period of a pendulum is 2.0 s in a stationary inertial frame of reference. What is its period when measured by an observer moving at a speed of 0.60 c with respect to the inertial frame of reference?
   (a) 1.2 s
   (b) 1.6 s
   (c) 2.5 s
   (d) 3.3 s
2. The observed relativistic length of a super rocket moving by the observer at 0.7c will be what factor times that of the measured rocket length if it were at rest?
   (a) 0.45
   (b) 0.71
   (c) 0.82
   (d) 1.4
3. An object moves by an observer at 0.5c (1/2 the speed of light). The total energy of the object will be what factor times that of the rest energy?
   (a) 0.600
   (b) 0.970
   (c) 1.15
   (d) 1.67

Part C (4 Marks)

Two motorcycle pack leaders named David and Emily are racing at relativistic speeds along perpendicular paths as shown in Figure. How fast does Emily recede as seen by David over his right shoulder?



Fourth Question (choose the most accurate answer) (20 Marks)

Tabulate your answer in your exam booklet as the shown table

No.	1	2	3	4	5
Answer	---	---	---	---	---

1. Light of wavelength 450 nm is incident on a target metal that has a work function of 1.8 eV. What stopping potential is required for this combination in a phototube? (h = 6.63 × 10^{-34} J·s, c = 3 × 10^{8} m/s, 1 eV = 1.6 × 10^{-19} J, and 1 nm = 10^{-9} m)

(a) 0.57 V
(b) 0.96 V
(c) 2.76 V
(d) 4.56 V

2. X-rays of wavelength of 0.065 nm undergo Compton scattering from free electrons in carbon. What is the wavelength of photons scattered at 90° relative to the incident beam? (h = 6.63 × 10^{-34} J·s, me = 9.11 × 10^{-31} kg, c = 3 × 10^{8} m/s, and 1 nm = 10^{-9} m)

(a) 0.0024 nm
(b) 0.0674 nm
(c) 0.0687 nm
(d) 0.0626 nm

3. What is the energy of a photon that has the same wavelength as a 12 eV electron? (h = 6.63 × 10^{-34} J·s)

(a) 5.6 × 10^{-16} eV
(b) 12 eV
(c) 24 eV
(d) 3.5 keV

4. What is the wavelength of the line in the Balmer series of hydrogen that is comprised of transitions from the n = 4 to the n = 2 level? (R = 1.097 × 10^{7} m^{-1} and 1 nm = 10^{-9} m)

(a) 380 nm
(b) 486 nm
(c) 523 nm
(d) 630 nm

5. At what temperature does the cosmic background radiation appear compatible with a blackbody source?

(a) 0.0003 K
(b) 0.03 K
(c) 3 K
(d) 300 K

Good Luck

Assiut University | Thermodynamics | Level: II المستوي : الثاني
Faculty of science | P 223 | 18/6/2019
Physics department | 2018–2019 | Time: 3 hours

Question No.1: (8 deg.),,,,, Choose the correct answer-(Or answers):

1. Different colors are: *A) waves* *B) particles* *C) vibrations*
2. Spectra emitted from some materials gives us an idea about:
   A) Light components *B) material structure* *C) Nature of light*
3. Thermal transitions in the universe take place from: A) *hot to cold* B) *cold to hot* C) *all the above*
4. The component of substance that carries its properties and composition is the:
   A) Atom *B) Molecule* *C) Ion*
5. The permanent & continuous motion of molecules is a.....motion
   A) Free *B) restricted* *C) thermal*
6. Dynamic thermal equilibrium means that .. stays constant. *A) pressure B) volume C) temperature*
7. Polyatomic Molecules make .....motion. *A) Transitional* *B) rotational* *C) vibrational*
8. To cool a gas, work is done.....: *A) on it* *B) by it* *C) all the above*
9. The zero law of thermodynamics shows that any two bodies are in equilibrium under condition of equality of its...: *A) temperature* *B) pressure* *C) volume*
10. The open system, allows the exchange of: *A) heat B) material C) work* .... Thus the mass becomes: *A) constant* *B) variable* ...& Energy: *A) constant* *B) variable*
11. The isolated system, disallows the exchange of: *A) heat B) material C) work* ... Thus the mass becomes: *A) constant* *B) variable* ... &Energy: *A) constant* *B) variable*
12. 8- Some of the following integrations are correct:
    A) . $\oint dU = 0$ *B)* $\oint \mathbf{dQ} = \mathbf{0}$ *C).* $\oint dW = \mathbf{0}$
13. The work done in cyclic process equals:
    A) zero *B) area under the curve* *C) area inside the curve*
14. The amount of energy it takes to increase the temperature of 1 g of a substance 1°C ..... *A) specific heat* *B) heat capacity* *C) molar sp. heat*
15. When the working substance completes a full cycle represented by a closed curve. *A). Q=U+W* *B). Q=W* *C). U=-W*
16. All mechanical movement except those involving friction forces is a ...process *(A) reversible* *(B) irreversible*

Question No.2: (15 deg.)

Choose and discuss the correct answer-(Or answers):

1. Vision requires the presence of: *A) Light Source* *B) Vision instrument* *C) medium*

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2. The intermolecular space of an ideal gas must be: *A) Large* *B) very large* *C) very small*

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3. The average kinetic energy for gas molecules is considered to be a scale for its.....

A) pressure *B) volume* *C) temperature*

4. Mono-atomic molecules that are represented by a points make....motion.

A) Transitional *B) rotational* *C) vibrational*

5- When a gas is heated, work is done..... *A) on it* *B) by it* *C) all the above*

6. Boltzmann's constant is a proportional constant between temperature and ....

A) Volume *B) pressure* *C) average kinetic energy*

7. The closed system, allows the exchange of: *A) heat* *B) material* *C) work* .... Thus the mass becomes: *A) constant* *B) variable* ... & Energy: *A) constant* *B) variable*

8. Some of the following integrations are incorrect

$A. \int_1^2 dU = U_2 - U_1$ $B. \int_1^2 dQ = Q_1 - Q_2$ $C. \int_1^2 dW = W_1 - W_2$

9. Isothermal expansion of the gas needs an amount of heat from the....

A) outside *B) inside* ... so work is done : *A) by it* *B)*

10. Mechanical work: *(A) can be* *(B) Cannot be* ... completely converted into heat

Question № 3 (15 degrees)

Explain shortly the physical meaning of the following equations:

$$P = \frac{1}{3} nm\overline{c^2}$$

$\frac{1}{2}m\overline{c^2} = \frac{3}{2}KT$

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$U = {}^{3}/_{2}NKT = {}^{3}/_{2}RT.$

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$dQ = dU + dW$

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$dW = +PdV$

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If dQ =dW= 0

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.....

If ΔU=0 and Q= - W

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$dU = -PdV$

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$\eta = \frac{W_{net-out}}{Q_0}$

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$\eta = 1 - \frac{Q_1}{Q_0} = 1 - \frac{T_1}{T_0}$

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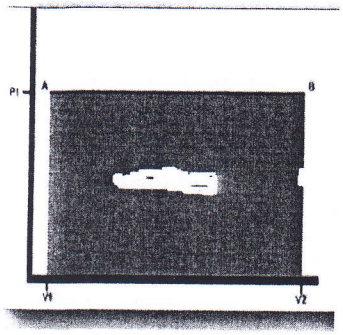
Question № 4 (12 degrees)

Comment shortly on the following images :



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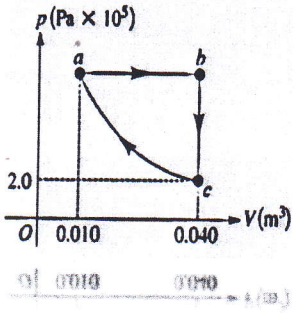

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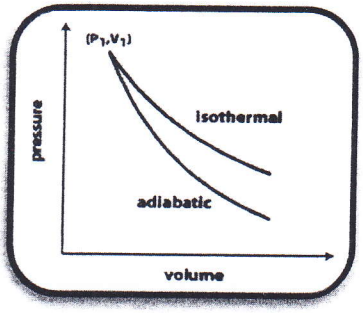

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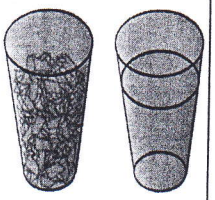
Which is more disordered? The glass of ice chips or the glass of water?



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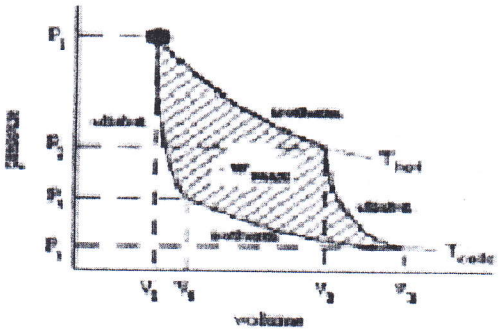

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حسام وحيد ____Best wishes__(4)____إنتهت الاسئلة مع التمنيات بالتوفيق