PHY101- Physics

Composed By Faheem Saqib

Final term Subjective

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PHY101 - Physics - Question No: 21 (M a r k s: 3)

Two people are carrying a uniform wooden board that is 3.00 m long and

weighs 160 N. If one person applies an upward force equal to 60 N at one end,

at what point does the other person lift? Begin with a free-body diagram of the

board.

Forces in x direction = 0

Forces in Y = F1 + F2 - W

Given:

L = 3.00 m F1 = 60 N

W = 160 N F2 = ? and x2 = ?

Sum of forces and torques = 0

Sum Force = F1 + F2 - W = 0

60N + F2 - 160 N = 0

F2 = 100 N

My pivot point is at F2.

Sum of torques = 0

Torque F1 = F1(L - x2)

Torque F2 = 0 b/c at pivot point

Torque W = W(L/2 - x2)

F1L - F1x2 + (WL)/2 - Wx2 = 0

(60)(3) - 60x2 + (160 * 3)/2 - 160x2 = 0

180-60x2 + 240-160x2 = 0

420-220x2 = 0

x2 = 1.9m

PHY101 - Physics - Question No: 22 (M a r k s: 3)

If a charged particle moves in a straight line through some region of space, can

you say that the magnetic field in that region is zero?

PHY101 - Physics - Question No: 23 (M a r k s: 3)

You want to explore the shape of a cel1ain molecule by scattering electrons of

momentum p from a gas of the molecules and studying the deflection of the

electrons. You will be able to see finer details in the molecules by (a)

increasing p; (b) decreasing p: (c) not worrying what p is.

PHY101 - Physics - Question No: 24 (M a r k s: 3)

A vessel is filled with gas at some equilibrium pressure and temperature. Can all gas molecules in the vessel have the same speed?

PHY101 - Physics - Question No: 25 (M a r k s: 3)

What are the properties of wave function?

Wave functions contain all the measurable information about the particles

Wave functions are continuous.

They allow energy calculations via schrodinger equation.

They establish the probability distribution in three dimensions.

They permit calculation of most probable values of given variables.

PHY101 - Physics - Question No: 26 (M a r k s: 5)

A bike accelerates uniformly from rest to a speed of 7.10 m/s over a distance of

35.4 m. Determine the acceleration of the bike.

$2as = vf_2 - vi_2$

$2a(35.4) = (7.10)_2 - (0)_2$

$2a(35.4) = 50.41$

$A = .71$ m/s_2

PHY101 - Physics - Question No: 27 (M a r k s: 5)

A flat loop of wire consisting of a single turn of cross-sectional area 8.00 cm^2 is

perpendicular to a magnetic field that increases uniformly in magnitude from

0.500 T to 2.50 T in 1.00 s. What is the resulting induced current if the loop

has a resistance of 2.00 W?

$E = (Bf-Bi)*A/t = (2.5-0.5)*8*10^{-4}/1 = 1.6*10^{-3}$ V

$I = E/R = 1.23$ mA

PHY101 - Physics - Question No: 28 (M a r k s: 5)

An ideal gas is contained in a vessel at 300 K. If the temperature is increased to

900 K, by what factor does each one of the following change?

(a) The average kinetic energy of the molecules.

(b) The rms molecular speed.

(c) The average momentum change of one molecule in a collision with a wall.

(d) The rate of collisions of molecules with walls.

(e) The pressure of the gas.

PHY101 - Physics - Question No: 29 (M a r k s: 5)

Who discover the nucleus? Write the experimental setup that he follows.

Ans:

Lord Rutherford discovered the nucleus. He carried out his famous experiment that showed the existence of a small but very heavy core of the atom. He arranged for a beam of alpha particles to strike gold atoms in a thin foil of gold. If the positive and negative charges in the atom were randomly distributed, all ' would go through without any deflection. But a lot of backscattering was seen, and some alphas were even deflected back in the direction of the incident beam. This was possible only if they were colliding with a very heavy object inside the atom.

PHY101 - Physics - Question No: 30 (M a r k s: 5)

In
an analogy between electric current and automobile traffic flow, what would correspond to charge? What would correspond to current?

PHY101 - Physics - Question No: 31 (M a r k s: 10)

(a)When can you expect a body to emit blackbody radiation?

(b) Which law is obeyed by Sun and other stars, briefly explain it.

(a) When can you expect a body to emit blackbody radiation?

Ans:

Waves are emitted when charges accelerate. Blackbody radiation occurs for

exactly this reason as well. If a body is heated up, the electrons, atoms, and molecules which it contains undergo violent random motion. Light may emit by electrons in one atom and absorbed in another. Even an empty box will be

filled with blackbody radiation because the sides of the box are made up of material that has charged constituents that radiate energy when they undergo acceleration during their random motion. A blackbody is both an ideal absorber and an ideal radiator. At high temperature, a body emits radiation of

shorter wavelength. Temperature is inversely proportional to wavelength.

(b) Which law is obeyed by Sun and other stars, briefly explain it.

Ans:

The Sun and other stars obey Wien's Law since the gases they are composed of emit radiation that is in equilibrium with the other materials. Wien's law allows astronomers to determine the temperature of a star because the wavelength at which a star is brightest is related to its temperature.

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Question No1

Which weighs more, a liter of ice or a liter of water?

Solution

Liter of water has more weight as compared to ice because it freezes making a given volume of ice lighter than the same amount of water. That is why ice floats in water.

Question No:

Will the current in a light bulb connected to a 220-V source be greater or less than when the same bulb is connected to 110-V source?

Solution

Greater, because current is directly proportional to voltage. $I = V / R$

Question No

How is the wavelength of light related to its frequency?

Solution

$c = \text{lambda times } f$

$f = c / \text{lambda}$

Scroll down to related links and look at "Conversion: frequency f to wavelength lambda and wavelength to frequency"

Question No.

We don't notice the de Broglie wavelength for a pitched baseball. Is this because the wavelength is very large or because it is very small?

Solution

We don't notice the de Broglie wavelength for a pitched baseball because the wavelength is very small

Question No

Does every magnet necessarily have a north and south pole? Explain

Solution

Yes every magnet necessarily has a north and south pole. The poles reaction to each other cause the magnet to attract

Question (Marks: 5)

Consider a lamp hanging from a chain. What is the tension in the chain?

Solution

As always, begin with a "free body diagram". Tension T acts upward on the lamp while the force of gravity pulls down with force w, the weight of the lamp. The net force is the vector sum of these two forces. The lamp is not accelerating so the force up must equal the force down. In terms of magnitudes, this means

T = w

Question # 1 of 5 (Start time: 10:39:48 AM)

In constructing a thermometer it is NECESSARY to use a substance that:

Select correct option:

- ◉ Expands linearly with rising temperature

- ○ Will not freeze

- ○ Will not boil

- ○ Undergoes some change when heated or cooled

Question # 2 of 5 (Start time: 10:41:11 AM)

What is the unit of magnification factor?

Select correct option:

- ○ meter.Kelvin

- ○ radian.Kelvin

- ○ degree.Kelvin

- ◉ no units

No lens is perfect because_____.

Select correct option:

○ They suffer from aberration

○ They are not perfectly spherical

○ It is nearly impossible to polish them

○ They are not cleaned with accuracy

Constant-volume gas thermometers using different gases all indicate nearly the same temperature when in contact with the same object it

Select correct option:

○ The volumes are all extremely large

◉ The volumes are all the same

○ The pressures are all extremely large

○ The particle concentrations are all extremely small

A thermometer indicates 98.67C It may be:

Select correct option:

- ○ Outdoors on ac old day
- ○ In a comfortable room
- ◉ In a cup of hot tea
- ○ In a normal person's mouth

If two objects are in thermal equilibrium with each other:

Select correct option:

- ○ They can not be moving
- ○ They can not be undergoing an elastic collision
- ○ They can not have di?erent pressures
- ◉ They can not be at di?erent temperatures