

Phy-101 Important Mcq's
For Final Term !!
Solve By Vu-Topper RM!!

وَتَعَزُّ مِنْ تَشَاءٍ وَتَذَلُّ مِنْ تَشَاءٍ



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 **0322-4021365**

Question No:1

(Marks:1)

Vu-Topper RM

The image produced by a convex mirror of an erect object in front of the mirror is always:

Virtual, erect, and larger than the object

Virtual, erect, and smaller than the object

Real, erect, and larger than the object

Real, erect, and smaller than the object

Question No:2

(Marks:1)

Vu-Topper RM

In some movies, you sometimes see an actor looking in a mirror and you can see his face in the mirror. During the filming of this scene, what does the actor see in the mirror?

His face

Your face

The movie camera (Correct)

The director's face

Question No:3

(Marks:1)

Vu-Topper RM

A femtometer is:

10-9 m

10-12 m

10-15 m

10-18 m

Question No:4

(Marks:1)

Vu-Topper RM

The "strength" of a lens is measured in _____.

Meters

Diopters

Lense meter (Correct)

Provatans

Question No:5

(Marks:1)

Vu-Topper RM

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

Undergoes some change when heated or cooled

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Question No:6

(Marks:1)

Vu-Topper RM

When an object (iron/tungsten) is heated, it emits light. It emits infrared (IR) light when it is heated at a temperature _____.

Below 800 degree C

Between 800 degree C to 1600 degree C

Between 1600 degree C to 2500 degree C

above 2500 degree C

Question No:7

(Marks:1)

Vu-Topper RM

The reason there are two slits, rather than one, in a Young's experiment is:

to create a path length difference

to increase the intensity

one slit is for frequency, the other for wavelength

one slit is for Electric fields , the other is for Magnetic fields

Question No:8

(Marks:1)

Vu-Topper RM

An electron is moving at $0.6c$. If we calculate its kinetic energy using $(1/2)mv^2$, we get a result that is:

Just right

Just half enough

Twice the correct value

About 28% too low (Correct)

Question No:9

(Marks:1)

Vu-Topper RM

During a slow adiabatic expansion of a gas:

The pressure remains constant

Energy is added as heat

Work is done on the gas

No energy enters or leaves as heat

Question No:10

(Marks:1)

Vu-Topper RM

The theoretical upper limit for the frequency of electromagnetic waves is:

just slightly greater than that of red light

there is no upper limit

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Question No:11

(Marks:1)

Vu-Topper RM

One revolution is the same as:

1 rad

57 rad

$\pi/2$ rad

π rad

2π rad

Question No:12

(Marks:1)

Vu-Topper RM

For a body to be in equilibrium under the combined action of several forces:

All the forces must be applied at the same point

all the forces must be applied at the same point

all of the forces form pairs of equal and opposite forces

any two of these forces must be balanced by a third force

Question No:13

(Marks:1)

Vu-Topper RM

Capacitors C1 and C2 are connected in series. The equivalent capacitance is

given by

$C_1 C_2 / (C_1 + C_2)$

$(C_1 + C_2) / C_1 C_2$

$1 / (C_1 + C_2)$

C_1 / C_2

Question No:14

(Marks:1)

Vu-Topper RM

If the potential difference across a resistor is doubled:

only the current is doubled

only the current is halved

only the resistance is doubled

only the resistance is halved

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Question No:15**(Marks:1)****Vu-Topper RM**

By using only two resistors, R_1 and R_2 , a student is able to obtain resistances of 3Ω , 4Ω , 12Ω , and 16Ω . The values of R_1 and R_2 (in ohms) are:

3, 4

2, 12

3, 16

4, 12**Question No:16****(Marks:1)****Vu-Topper RM**

Faraday's law states that an induced emf is proportional to:
the rate of change of the electric field

the rate of change of the magnetic flux

the rate of change of the electric flux

the rate of change of the magnetic field

Question No:17**(Marks:1)****Vu-Topper RM**

A generator supplies 100V to the primary coil of a transformer. The primary has 50 turns and the secondary has 500 turns. The secondary voltage is:

1000V

500V

250V

100V

Question No:18**(Marks:1)****Vu-Topper RM**

Which of the following electromagnetic radiations has photons with the greatest energy?

blue light

yellow light

x rays

radio waves

Question No:19

(Marks:1)

Vu-Topper RM

We desire to make an LC circuit that oscillates at 100 Hz using an inductance of 2.5H. We also need a capacitance of:

1 F

1mF

1 μ F

100 μ F

Question No:20

(Marks:1)

Vu-Topper RM

The wavelength of red light is 700 nm. Its frequency is

_____.

4.30 * 10⁴ Hertz

4.30 * 10³ Hertz

4.30 * 10⁵ Hertz

4.30 * 10² Hertz

Question No:21

(Marks:1)

Vu-Topper RM

Which of the following statements is NOT TRUE about electromagnetic waves?

Electromagnetic waves satisfy the Maswell's Equation.

Electromagnetic waves can not travel through space.

The receptions of electromagnetic waves require an antenna.

The electromagnetic radiation from a burning candle is unpolarized.

Question No:22

(Marks:1)

Vu-Topper RM

Radio waves and light waves are

Longitudinal waves

Transverse waves

Electromagnetic and transverse both

Question No:23

(Marks:1)

Vu-Topper RM

An ideal gas expands into a vacuum in a rigid vessel. As a result there is:

a change in entropy

a decrease of internal energy

an increase of pressure

a change in temperature

Question No:24

(Marks:1)

Vu-Topper RM

The Stern-Gerlach experiment makes use of:

a strong uniform magnetic field

a strong non-uniform magnetic field

a strong uniform electric field

a strong non-uniform electric field

Question No:25

(Marks:1)

Vu-Topper RM

A net torque applied to a rigid object always tends to produce:

linear acceleration

rotational equilibrium

angular acceleration

rotational inertia

Question No:26

(Marks:1)

Vu-Topper RM

As the wavelength of a wave in a uniform medium increases, its speed will _____.

Decrease

Increase

Remain the same

None of these

Question No:27

(Marks:1)

Vu-Topper RM

The current in a car headlamp is 2.0 A. The headlamp is switched on for 3.0 minutes. How much charge passes through the headlamp?

360c

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Question No:28 (Marks:1) **Vu-Topper RM**

A gas which strictly obeys the gas laws under all conditions of temperature and pressure is called:

Perfect gases

Question No:29 (Marks:1) **Vu-Topper RM**

In RL series circuit phase angle is given by:

$\tan^{-1}(\omega L/R)$

Question No:30 (Marks:1) **Vu-Topper RM**

Which of the following have the greatest wavelength?

Radio waves

Question No:31 (Marks:1) **Vu-Topper RM**

When a charge is projected perpendicular to a uniform magnetic field, its path is:

A circular path

Question No:32 (Marks:1) **Vu-Topper RM**

When two objects come to common temperature, the body is said to be in:

Thermal equilibrium

Question No:33 (Marks:1) **Vu-Topper RM**

Which method(s) of heat transfer can take place in vacuum?

Electromagnetic waves

Question No:34 (Marks:1) **Vu-Topper RM**

A step-down transformer is used to:

Decrease the voltage

Question No:35 (Marks:1) **Vu-Topper RM**

In an adiabatic process:

The work done by the environment on the system equals the change in internal energy.

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Question No:36 (Marks:1) **Vu-Topper RM**

The focal length of a spherical mirror is N times its radius of curvature where N is:

$F=R/2$

Question No:37 (Marks:1) **Vu-Topper RM**

Capacitive reactance X_c is:

$1/2 \pi f c$

Question No:38 (Marks:1) **Vu-Topper RM**

Force per unit charge is:

Electric field.

Question No:39 (Marks:1) **Vu-Topper RM**

If the kinetic energy of a free particle is much less than its rest energy then its kinetic energy is proportional to:

The square of the magnitude of its momentum

Question No:40 (Marks:1) **Vu-Topper RM**

Which physical quantity is produced by a calculation where a charge is multiplied by a potential difference (p.d)?

Energy

Question No:41 (Marks:1) **Vu-Topper RM**

Work done on a charged particle moving in uniform magnetic field is:

Zero

Question No:42 (Marks:1) **Vu-Topper RM**

Which of the following is equivalent to 1 V?

1 Joule/1 coulomb = 1 J/C

Question No:43 (Marks:1) **Vu-Topper RM**

If I_o is the peak value of an AC supply, then its rms value is given as
Irms:?[phy101]

$I_o/\text{square root } 2$

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Question No:44

(Marks:1)

Vu-Topper RM

Heat has the same units as:

Work

Question No:45

(Marks:1)

Vu-Topper RM

Which of the following types of electromagnetic radiation at the vacuum?

All of these travel at the same speed

Question No:46

(Marks:1)

Vu-Topper RM

Inductive reactance X_L of an inductor is π

$2(\pi) f L$

Question No:47

(Marks:1)

Vu-Topper RM

The sum of electric and magnetic force is called

Lorentz force

Question No:48

(Marks:1)

Vu-Topper RM

Radio waves and light waves are _____.

Electromagnetic and transverse

Question No:49

(Marks:1)

Vu-Topper RM

Kirchhoff's 2nd rule is the manifestation of the law of conservation of

Energy

Question No:50

(Marks:1)

Vu-Topper RM

The total energy in an circuit is 5.0×10^{-6} J. if $L=25\text{mH}$ the maximum current is:

20mA

Question No:51

(Marks:1)

Vu-Topper RM

The potential difference between the ends of a conductor is 12V. How much electrical energy is converted to other forms of energy in the conductor when 100C of charge flows through it?

1200J

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Question No:52 (Marks:1)

Vu-Topper RM

The Focal length of convex lens is:

Positive

Question No:53 (Marks:1)

Vu-Topper RM

The AC circuit in which current and voltage are in phase the power factor is

1

Question No:54 (Marks:1)

Vu-Topper RM

The wavelength of red light is 700 nm. Its frequency is _____.

4.29×10^{14} hertz

Question No:55 (Marks:1)

Vu-Topper RM

The known laws of electromagnetism before James Clerk Maxwell were following
EXCEPT

Faraday's Law

Question No:56 (Marks:1)

Vu-Topper RM

When some dielectric is inserted between the plates of a capacitor, then capacitance;

Increased

Question No:57 (Marks:1)

Vu-Topper RM

Which of the following is NOT the characteristics of electromagnetic waves?

They can travel with different speeds in vacuum depending on λ

Question No:58 (Marks:1)

Vu-Topper RM

The quantity of $\Delta V / \Delta r$ is called

Potential gradient

Question No:59

(Marks:1)

Vu-Topper RM

Which electromagnetic radiation transmits the highest photon energy?

Gamma rays

Question No:60

(Marks:1)

Vu-Topper RM

The reaction of an particle at 50 Hz is 10.0 its reactance at 100Hz becomes

5.0

Question No:61

(Marks:1)

Vu-Topper RM

Work done on a charged particle moving in uniform magnetic field is

Zero

Question No:62

(Marks:1)

Vu-Topper RM

Select the correct statement

Gamma Rays have higher frequency than infrared waves

Question No:63

(Marks:1)

Vu-Topper RM

Potentiometer can be used as

Potential divider

Question No:64

(Marks:1)

Vu-Topper RM

All of the followings are the different types of mental images; people generally experience them while close their eyes Except:

Solving an algebra equations

Question No:65

(Marks:1)

Vu-Topper RM

The nation that motivational state of the organism is understood and explained in terms of positive and negative environmental stimuli BEST connects to;

Incentive approaches

Question No:66

(Marks:1)

Vu-Topper RM

If one wants to increase the capacity of short-term memory, through which process more items can be held?

Chunking

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Question No:67

(Marks:1)

Vu-Topper RM

If potential difference across two plates of a capacitor is doubled, then

Four times

Question No:68

(Marks:1)

Vu-Topper RM

How could the unit of potential difference the volt also be written?

J/C

Question No:69

(Marks:1)

Vu-Topper RM

If magnetic field is doubled then magnetic energy density becomes

Four times

Question No:70

(Marks:1)

Vu-Topper RM

The primary of a 3.1 step-up transformer is connected to a source and the secondary this situation is P. If R is connected directly to the source it will dissipate a power of:

P/9

Question No:71

(Marks:1)

Vu-Topper RM

A particle having $2e$ charge falls through a potential difference of 5.V energy acquired by it is

10 eV

Question No:72

(Marks:1)

Vu-Topper RM

A generator supplies 100V to the primary coil of a transformer. The primary has 50 turns and the secondary has 500 turns. The secondary voltage is

1000V

Question No:73

(Marks:1)

Vu-Topper RM

The combined effect of resistance and reactance is known as

Impedance

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Question No:74

(Marks:1)

Vu-Topper RM

A transparent refracting medium bounded by the two curved surfaces called

Prism

Question No:75

(Marks:1)

Vu-Topper RM

A student rubs a rod held in his hand. Which action causes the rod to gain a large electrostatic charge

Rubbing a polythene rod with a woollen duster

Question No:76

(Marks:1)

Vu-Topper RM

A charge of 30 C flows through an electric appliance in 2.0 minutes. What is the average current in the appliance?

0.25A

Question No:77

(Marks:1)

Vu-Topper RM

Total flux through a closed surface depends on

Charge and -N

Question No:78

(Marks:1)

Vu-Topper RM

Electromagnetic waves emitted from antenna are

Transverse

Question No:79

(Marks:1)

Vu-Topper RM

Two parallel straight wires carrying current in same direction will.

Attract each other

Question No:80

(Marks:1)

Vu-Topper RM

Charge carriers in electrolysis are:

Positive and negative ions

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Question No:81

(Marks:1)

Vu-Topper RM

A detector is used to detect the speed at a particular wave if the frequency of an electromagnetic signal is 400 MHz, the speed define the detector is

300000 km/s

Question No:82

(Marks:1)

Vu-Topper RM

The product of resistance and capacitance is called

Time

Question No:83

(Marks:1)

Vu-Topper RM

Greenhouse gases absorb _____ radiation

Infrared

Question No:84

(Marks:1)

Vu-Topper RM

Electromagnetic waves do not transport

Charge

Question No:85

(Marks:1)

Vu-Topper RM

Electromagnetic and transverse both

Longitudinal waves

Transverse waves

Electromagnetic and transverse both

Electromagnetic and longitudinal both

Question No:86

(Marks:1)

Vu-Topper RM

An organ pipe with both ends open is 0.85m long. Assuming that the speed of sound is 340m/s, the frequency of the third harmonic of this pipe is:

A. 200 Hz

B. 300 Hz

C. 400 Hz

D. 600 Hz

Question No:87

(Marks:1)

Vu-Topper RM

Room temperature is about 20 degrees on the:
Kelvin scale

Celsius scale

Fahrenheit scale

Absolute scale

Question No:88

(Marks:1)

Vu-Topper RM

A particle with zero mass and energy E carries momentum:

Ec

Ec^2

vEc

E/c

Question No:89

(Marks:1)

Vu-Topper RM

J.J.Thompson's measurement of e/m for electrons provides evidence of the:

Wave nature of matter

Particle nature of matter

Wave nature of radiation

Particle nature of radiation

Question No:90

(Marks:1)

Vu-Topper RM

During a slow adiabatic expansion of a gas:

The pressure remains constant

Energy is added as heat

Work is done on the gas

No energy enters or leaves as heat

Question No:91

(Marks:1)

Vu-Topper RM

A force of 5000N is applied outwardly to each end of a 5.0-m long rod with a radius of 34.0 cm and a Young's modulus of $125 \times 10^8 \text{ N/m}^2$.

The elongation of the rod is:

0.55mm

1.42mm

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Question No:92

(Marks:1)

Vu-Topper RM

An object attached to one end of a spring makes 20 complete oscillations in 10 s. Its period is: Select correct option:

2Hz

0.5 s

0.5Hz

2 s

Question No:93

(Marks:1)

Vu-Topper RM

back and forth in a leftward and rightward direction. This type of wave is known as a

Mechanical

Electromagnetic

Transverse

Longitudinal

Question No:94

(Marks:1)

Vu-Topper RM

The flow rate of blood through the average human aorta is about $9.0 \times 10^3 \text{ cm}^3/\text{s}$. If the aorta has a radius of 1.0 cm, what is the velocity of the blood flow?

14 cm/s

32 cm/s

37 cm/s

29 cm/s

Question No:95

(Marks:1)

Vu-Topper RM

Metal pipes, used to carry water, sometimes burst in the winter because:

Metal contracts more than water

Outside of the pipe contracts more than the inside

Metal becomes brittle when cold

Water expands when it freezes

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Question No:96

(Marks:1)

Vu-Topper RM

The reason there are two slits, rather than one, in a young's experiment is:

To create a path length difference

Question No:97

(Marks:1)

Vu-Topper RM

Which of the following types of electromagnetic radiation travels at the greatest speed in vacuum?

(Radio, gamma, x)rays .

Question No:98

(Marks:1)

Vu-Topper RM

Electric energy is measured :

Watt

Question No:99

(Marks:1)

Vu-Topper RM

Of the following which might NOT vanish over one cycle of a cyclic process?

The work done by the substance

Question No:100

(Marks:1)

Vu-Topper RM

The most refined form of matter is:

Light

Question No:101

(Marks:1)

Vu-Topper RM

How could the unit of potential difference, the volt, also be written?

J/C

Question No:102

(Marks:1)

Vu-Topper RM

In Compton scattering from stationary particles the maximum change in wavelength can be made smaller by using.

More massive particles

Question No:103

(Marks:1)

Vu-Topper RM

Hotness or coldness of an object is represented in terms of:

Temperature

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Question No:104

(Marks:1)

Vu-Topper RM

The unit of thermal conductivity might be:

Cal/(cm*s*C?)

Question No:105

(Marks:1)

Vu-Topper RM

Which physical quantity is produced by a calculation where a charge is multiplied by a potential difference (p.d)?

Energy

Question No:106

(Marks:1)

Vu-Topper RM

A transparent refracting medium bounded by the two curved surfaces called:

Prism

Question No:107

(Marks:1)

Vu-Topper RM

It is more difficult to measure the coefficient of volume expansion of a liquid than that of a solid because?

The containing vessel also expands

Question No:108

(Marks:1)

Vu-Topper RM

The product of resistance and capacitance is called

Time

Question No:109

(Marks:1)

Vu-Topper RM

The potential difference between the ends of a conductor is 12 V. How much electrical energy is converted to other forms of energy in the conductor when 100C of charge flows through it?

1200

Question No:110

(Marks:1)

Vu-Topper RM

When we accelerate the charge, which types of waves are produced?

Electromagnetic waves

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Question No:111 (Marks:1) **Vu-Topper RM**
Due to relative motion of observer and the frames of reference of events, time always:
Statics itself

Question No:112 (Marks:1) **Vu-Topper RM**
The allowed energy states of atoms or molecules can be described by a set of _____.
Quantum numbers

Question No:113 (Marks:1) **Vu-Topper RM**
Probability values are assigned on a scale of
0 to 1

Question No:114 (Marks:1) **Vu-Topper RM**
The magnitude of the momentum of a particle can never exceed:
 E/c , where E is its total energy

Question No:115 (Marks:1) **Vu-Topper RM**
The ratio of the size of image to the size of object.
Angular magnification

Question No:116 (Marks:1) **Vu-Topper RM**
When white light passes through a prism, it splits into _____ colors.
7

Question No:117 (Marks:1) **Vu-Topper RM**
Electromagnetic waves do not transport:
Charge

Question No:118 (Marks:1) **Vu-Topper RM**
A heat of transformation of a substance is:
The energy per unit mass absorbed as heat during a phase transformation

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Question No:119

(Marks:1)

Vu-Topper RM

Which of the following electromagnetic radiations has photons with the greatest energy?

X rays

Question No:120

(Marks:1)

Vu-Topper RM

When two objects come to common temperature, the body is said to be in:

Thermal equilibrium

Question No:121

(Marks:1)

Vu-Topper RM

If electric and gravitational force on an electron in a uniform electric field balance each other, then the intensity of electric field will be:

Mg/q

Question No:122

(Marks:1)

Vu-Topper RM

Electromagnetic waves do not transport:

Charge

Question No:123

(Marks:1)

Vu-Topper RM

During a slow adiabatic expansion of a gas No energy enters or leaves as heat

52.

Question No:124

(Marks:1)

Vu-Topper RM

The electron states that constitute a single shell for an atom all have:

The same value of n

Question No:125

(Marks:1)

Vu-Topper RM

An isothermal process for an ideal gas is represented on a p-V diagram by:

A portion of a hyperbola

Question No:126

(Marks:1)

Vu-Topper RM

The concept of an electric field lines is introduced by:

Faraday

Question No:127

(Marks:1)

Vu-Topper RM

The current in a car headlamp is 2.0A. The headlamp is switched on for 30 minutes. How much charge passes through the headlamp?

360 C

Question No:128

(Marks:1)

Vu-Topper RM

In some movies, you sometimes see an actor looking in a mirror and you can see his face in the mirror. During the filming of this scene, what does the actor see in the mirror?

The movie camera

Question No:129

(Marks:1)

Vu-Topper RM

The pauli exculusion principle is obeyed by:

All particles with spin quantum numbers of $\frac{1}{2}$

Question No:130

(Marks:1)

Vu-Topper RM

The focal length of convex lens is:

Positive

Question No:131

(Marks:1)

Vu-Topper RM

An electron ($m=9.11 \times 10^{-31}\text{kg}$) has a speed of 0.95C. its kinetic energy is;

$1.8 \times 10^{-31}\text{J}$

Question No:132

(Marks:1)

Vu-Topper RM

An electron ($m=9.11 \times 10^{-31}\text{kg}$) has a speed of 4.0.95C. Its kinetic energy is:

$1.8 \times 10^{-13}\text{J}$

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Question No:133

(Marks:1)

Vu-Topper RM

An electron ($m=9.11 \times 10^{-31}\text{kg}$) has a momentum of $4.0 \times 10^{-22}\text{kg}\cdot\text{m/s}$. Its kinetic energy:

$6.3 \times 10^{-14}\text{J}$

Question No:134

(Marks:1)

Vu-Topper RM

Force on a charged particle is zero when projected at angle with the magnetic field

0 degree

Question No:135

(Marks:1)

Vu-Topper RM

If potential difference across two plates of a capacitor is doubled, then energy stored in it will be:

Four times

Question No:136

(Marks:1)

Vu-Topper RM

In case of metallic conductors, the charge carriers are.

Electrons

Question No:137

(Marks:1)

Vu-Topper RM

Room temperature is about 20 to 22 degrees on the:

Celcius scale

Question No:138

(Marks:1)

Vu-Topper RM

As compared to distance measured by an observer on Earth, the distance from earth star measured by an observer in a moving spaceship would seem:

Same

Question No:139

(Marks:1)

Vu-Topper RM

Evidence that a gas consists mostly of empty space is the fact that The density of a gas becomes much greater when it is

liquefied

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Question No:140 (Marks:1)

Vu-Topper RM

For an electron, the rest mass energy is:

0.511 MeV

Question No:141 (Marks:1)

Vu-Topper RM

Antiparticle of electron is:

Position

Question No:142 (Marks:1)

Vu-Topper RM

According to the first law of thermodynamics, applied to a gas, the increase in the internal energy during any process

Equals the heat input plus the work done on the gas

Question No:143 (Marks:1)

Vu-Topper RM

The approach to personality stresses that people possess a basic goodness, and have a natural tendency to grow to higher levels of functioning is.

Humanistic

Question No:144 (Marks:1)

Vu-Topper RM

In a photoelectric experiment at a frequency above cut off, the stopping potential is proportional to :

The energy of the most energetic electron after it is ejected

Question No:145 (Marks:1)

Vu-Topper RM

There is a temperature at which the reading on the kelvin scale is numerically:

Equal to that on the Celsius scale

Question No:146 (Marks:1)

Vu-Topper RM

When you stand in front of a plane mirror, your image is:

Virtual, erect and the same size as you

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Question No:147 (Marks:1) **Vu-Topper RM**

The process for which entropy remains constant is:

A reversible process

Question No:148 (Marks:1) **Vu-Topper RM**

The appearance of colors in thin film is due to:

Interference

Question No:149 (Marks:1) **Vu-Topper RM**

Greenhouse gases absorb _____ radiation

Infrared

Question No:150 (Marks:1) **Vu-Topper RM**

The theoretical upper limit for the frequency of electromagnetic waves is:

There is no upper limit

Question No:151 (Marks:1) **Vu-Topper RM**

Heat has the same units as:

Work

Question No:152 (Marks:1) **Vu-Topper RM**

Capacitance of a capacitor in vacuum is given by:

ϵ_0 / d

Question No:153 (Marks:1) **Vu-Topper RM**

An electron in a K shell of an atom has the principal quantum number:

$n = 1$

Question No:154 (Marks:1) **Vu-Topper RM**

Bending of light around the edges of an obstacle called:

Diffraction

Question No:155 (Marks:1) **Vu-Topper RM**

In RL series circuit phase angle is given by:

$\tan^{-1}(\omega L/R)$

Question No:156

(Marks:1)

Vu-Topper RM

Interface of light is evidence that:

Light is a wave phenomenon

Question No:157

(Marks:1)

Vu-Topper RM

In a photoelectric effect experiment at a frequency above cut off the number of electrons ejected is proportional to:

The number of photons that hit the sample

Question No:158

(Marks:1)

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In a photoelectric effect experiment the stopping potential is:

The electric potential that causes the electron current to vanish

Question No:159

(Marks:1)

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In an adiabatic process:

The work done by the environment on the system equals the change in internal energy

Question No:160

(Marks:1)

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A free electron and a free proton have the same kinetic energy. This means that, compared to the matter wave associated with the proton, the matter wave associated with the electron has:

A longer wavelength and the same frequency

Question No:161

(Marks:1)

Vu-Topper RM

Polarization experiments provide evidence that light is:

A transverse wave

Question No:162

(Marks:1)

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If light of low wavelength is used in young's double slit experiment, then width of the fringe will:

Decreases

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Question No:163

(Marks:1)

Vu-Topper RM

Lenz's law is in accordance with law of conservation of
Energy...

Question No:164

(Marks:1)

Vu-Topper RM

The known laws of electromagnetism before James Clerk Maxwell were following EXCEPT:

Faraday's Law

Question No:165

(Marks:1)

Vu-Topper RM

A particle having $2e$ charge falls through a potential difference of $5V$ energy acquired by it is.

$10eV$

Question No:166

(Marks:1)

Vu-Topper RM

According to relativistic theory a particle of mass m with a momentum of $2mc$ has a speed of:

$c/2$

Question No:167

(Marks:1)

Vu-Topper RM

If the kinetic energy of a free particle is much less than its rest energy then its kinetic energy is proportional to:

The square of the magnitude of its momentum

Question No:168

(Marks:1)

Vu-Topper RM

The two metallic strips that constitute some thermostats must differ in:

Coefficient of linear expansion

Question No:169

(Marks:1)

Vu-Topper RM

Phase difference between V and I of an AC through resistor is:

0 degree

Question No:170

(Marks:1)

Vu-Topper RM

Average value of current and voltage over complete cycle is:

Zero

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Question No:171

(Marks:1)

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A detector is used to detect the speed of a particular wave. If the frequency of an electromagnetic signal is 400 MHz, the speed detected by detector is _____.

300000 km/s

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As a 2.0-kg block travels around a 0.50-m radius circle it has an angular speed of 12 rad/s. The circle is parallel to the xy plane and is centered on the z axis, a distance of 0.75m from the origin. The z component of the angular momentum around the origin is:

- ▶ 6.0kg · m²/s
- ▶ 9.0kg · m²/s
- ▶ 11 kg · m²/s
- ▶ 14 kg · m²/s

A net torque applied to a rigid object always tends to produce:

- ▶ linear acceleration
- ▶ rotational equilibrium
- ▶ angular acceleration
- ▶ rotational inertia

An object attached to one end of a spring makes 20 vibrations in 10 s. Its angular frequency is:

- ▶ 1.57 rad/s
- ▶ 2.0 rad/s
- ▶ 6.3 rad/s

In simple harmonic motion, the restoring force must be proportional to the:

- ▶ amplitude
- ▶ frequency
- ▶ velocity

► **displacement**

Mercury is a convenient liquid to use in a barometer because:

- it is a metal
- it has a high boiling point
- it expands little with temperature

► **it has a high density**

The units of the electric field are:

- **J/m**
- J/(C·m)
- J/C
- J·C

A farad is the same as a

- **J/V**
- V/J
- C/V
- V/C

We desire to make an LC circuit that oscillates at 100 Hz using an inductance of 2.5H. We also need a capacitance of:

- 1 F
- 1mF
- 1 μ F
- **100 μ F**

The wavelength of red light is 700 nm. Its frequency is _____.

- ▶ 4.30×10^4 Hertz
- ▶ 4.30×10^3 Hertz
- ▶ **4.30×10^5 Hertz**
- ▶ 4.30×10^2 Hertz

Which of the following statements is NOT TRUE about electromagnetic waves?

- ▶ Electromagnetic waves satisfy the Maswell's Equation.
- ▶ Electromagnetic waves can not travel through space.
- ▶ The receptions of electromagnetic waves require an antenna.
- ▶ **The electromagnetic radiation from a burning candle is unpolarized.**

Radio waves and light waves are _____.

- ▶ Longitudinal waves
- ▶ Transverse waves
- ▶ **Electromagnetic and transverse both**
- ▶ Electromagnetic and longitudinal both

Wien's Law states that, $\lambda_{max} =$ _____ K.

- ▶ 2.90×10^{-3} Hertz
- ▶ 2.90×10^{-3} s
- ▶ 2.90×10^{-3} kg
- ▶ **2.90×10^{-3} m**

Interference of light is evidence that:

- ▶ the speed of light is very large

- ▶ light is a transverse wave
- ▶ **light is a wave phenomenon**
- ▶ light is electromagnetic in character

Fahrenheit and Kelvin scales agree numerically at a reading of:

- ▶ **-40**
- ▶ 0
- ▶ 273
- ▶ 574

According to the theory of relativity:

- ▶ **moving clocks run fast**
- ▶ energy is not conserved in high speed collisions
- ▶ the speed of light must be measured relative to the ether
- ▶ none of the above are true

Light from a stationary spaceship is observed, and then the spaceship moves directly away from the observer at high speed while still emitting the light. As a result, the light seen by the observer has:

- ▶ higher frequency and a longer wavelength than before
- ▶ **lower frequency and a shorter wavelength than before**
- ▶ higher frequency and a shorter wavelength than before
- ▶ lower frequency and a longer wavelength than before

How fast should you move away from a 6.0×10^{14} Hz light source to observe waves with a frequency of 4.0×10^{14} Hz?

- ▶ 20c
- ▶ **38c**
- ▶ 45c
- ▶ 51c

The quantum number n is most closely associated with what property of the electron in a hydrogen atom?

- ▶ **Energy**
- ▶ Orbital angular momentum
- ▶ Spin angular momentum
- ▶ Magnetic moment

The quantum number m_s is most closely associated with what property of the electron in an atom?

- ▶ Magnitude of the orbital angular momentum
- ▶ **Energy**
- ▶ z component of the spin angular momentum
- ▶ z component of the orbital angular momentum

As the wavelength of a wave in a uniform medium increases, its speed will

_____.

- ▶ Decrease
- ▶ Increase
- ▶ **Remain the same**
- ▶ None of these

The number of significant figures in 0.00150 is:

- ▶ 5
- ▶ 4
- ▶ 3
- ▶ 2

For a body to be in equilibrium under the combined action of several forces:

- ▶ All the forces must be applied at the same point
- ▶ all of the forces form pairs of equal and opposite forces
- ▶ any two of these forces must be balanced by a third force
- ▶ the sum of the torques about any point must equal zero

A bucket of water is pushed from left to right with increasing speed across a horizontal surface. Consider the pressure at two points at the same level in the water.

- ▶ It is the same
- ▶ It is higher at the point on the left
- ▶ It is higher at the point on the right
- ▶ At first it is higher at the point on the left but as the bucket speeds up it is

lower there

An organ pipe with both ends open is 0.85m long. Assuming that the speed of sound is 340m/s, the frequency of the third harmonic of this pipe is:

- ▶ 200 Hz
- ▶ 300 Hz

► 400 Hz

► 600 Hz

Capacitors C1 and C2 are connected in series. The equivalent capacitance is given by

► $C_1 C_2 / (C_1 + C_2)$

► $(C_1 + C_2) / C_1 C_2$

► $1 / (C_1 + C_2)$

► C_1 / C_2

If the potential difference across a resistor is doubled:

► only the current is doubled

► only the current is halved

► only the resistance is doubled

► only the resistance is halved

By using only two resistors, R1 and R2, a student is able to obtain resistances of 3 Ω , 4 Ω , 12 Ω , and 16 Ω . The values of R1 and R2 (in ohms) are:

► 3, 4

► 2, 12

► 3, 16

► 4, 12

Faraday's law states that an induced emf is proportional to:

► the rate of change of the electric field

► the rate of change of the magnetic flux

- ▶ the rate of change of the electric flux
- ▶ the rate of change of the magnetic field

A generator supplies 100V to the primary coil of a transformer. The primary has 50 turns and the secondary has 500 turns. The secondary voltage is:

- ▶ 1000V
- ▶ 500V
- ▶ 250V
- ▶ 100V

Which of the following electromagnetic radiations has photons with the greatest energy?

- ▶ blue light
- ▶ yellow light
- ▶ x rays
- ▶ radio waves

A virtual image is one:

- ▶ toward which light rays converge but do not pass through
- ▶ from which light rays diverge as they pass through
- ▶ toward which light rays converge and pass through
- ▶ from which light rays diverge but do not pass through

What is the unit of magnification factor?

- ▶ meter.Kelvin
- ▶ radian.Kelvin

- ▶ degree.Kelvin
- ▶ no units

During an adiabatic process an object does 100 J of work and its temperature decreases by 5K. During another process it does 25 J of work and its temperature decreases by 5 K. Its heat capacity for the second process is.

- ▶ 20 J/K
- ▶ 100 J/K
- ▶ 15 J/K
- ▶ 5 J/K

An ideal gas expands into a vacuum in a rigid vessel. As a result there is:

- ▶ a change in entropy
- ▶ a decrease of internal energy
- ▶ an increase of pressure
- ▶ a change in temperature

The Stern-Gerlach experiment makes use of:

- ▶ a strong uniform magnetic field
- ▶ a strong non-uniform magnetic field
- ▶ a strong uniform electric field
- ▶ a strong non-uniform electric field

A large collection of nuclei are undergoing alpha decay. The rate of decay at any instant is proportional to:

- ▶ the number of undecayed nuclei present at that instant

- ▶ the time since the decays started
- ▶ the time remaining before all have decayed
- ▶ the half-life of the decay

Consider Gauss's law: $\oint \mathbf{E} \cdot d\mathbf{A} = q/\epsilon_0$. Which of the following is true?

- ▶ E must be the electric field due to the enclosed charge
- ▶ If $q = 0$, then $E = 0$ everywhere on the Gaussian surface
- ▶ If the three particles inside have charges of $+q$, $+q$, and $-2q$, then the integral is zero
- ▶ on the surface E is everywhere parallel to $d\mathbf{A}$

A charged point particle is placed at the center of a spherical Gaussian surface.

The electric flux Φ_E is changed if:

- ▶ the sphere is replaced by a cube of the same volume
- ▶ the sphere is replaced by a cube of one-tenth the volume
- ▶ the point charge is moved off center (but still inside the original sphere)
- ▶ the point charge is moved to just outside the sphere

Choose the INCORRECT statement:

- ▶ Gauss' law can be derived from Coulomb's law
- ▶ Gauss' law states that the net number of lines crossing any closed surface in an outward direction is proportional to the net charge enclosed within the surface
- ▶ Coulomb's law can be derived from Gauss' law and symmetry

► According to Gauss' law, if a closed surface encloses no charge, then the electric field must vanish everywhere on the surface

The outer surface of the cardboard center of a paper towel roll:

- is a possible Gaussian surface
- cannot be a Gaussian surface because it encloses no charge
- cannot be a Gaussian surface since it is an insulator
- cannot be a Gaussian surface because it is not a closed surface

A physics instructor in an anteroom charges an electrostatic generator to $25 \mu\text{C}$, then carries it into the lecture hall. The net electric flux in $\text{N} \cdot \text{m}^2/\text{C}$ through the lecture hall walls is:

- 0
- 25×10^{-6}
- 2.2×10^5
- 2.8×10^6

A point particle with charge q is placed inside the cube but not at its center. The electric flux through any one side of the cube:

- is zero
- is $q/0$
- is $q/60$
- cannot be computed using Gauss' law

A particle with charge $5.0\text{-}\mu\text{C}$ is placed at the corner of a cube. The total electric flux in $\text{N} \cdot \text{m}^2/\text{C}$ through all sides of the cube is:

- ▶ 0
- ▶ 7.1×10^4
- ▶ 9.4×10^4
- ▶ **5.6×10^5**

Questions:

1. Which weighs more, a liter of ice or a liter of water?
2. 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?
3. How is the wavelength of light related to its frequency?
4. 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?
5. Does every magnet necessarily have a north and south pole? Explain
6. In a cool room, a metal or marble table top feels much colder to the touch than does a wood surface even though they are at the same temperature. Why?
7. If a water wave oscillates up and down three times each second and the distance between wave crests is 2 m, what is its frequency? What is its wavelength? What is its wave speed?
8. A transformer has $N_1 = 350$ turns and $N_2 = 2\,000$ turns. If the input voltage is coil?

9. Why do astronomers looking at distant galaxies talk about looking backward in time?
10. Some distant astronomical objects, called quasars, are receding from us at half the speed of light (or greater). What is the speed of the light we receive from these quasars?

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14. A point particle with charge q is at the center of a Gaussian surface in the form of a cube. The electric flux through any one face of the cube is:

- ▶ $q/0$
- ▶ $q/4\pi\epsilon_0$
- ▶ $q/30$
- ▶ **$q/60$**

The table below gives the electric flux in $\text{N}\cdot\text{m}^2/\text{C}$ through the ends and round surfaces of four Gaussian surfaces in the form of cylinders. Rank the cylinders according to the charge inside, from the most negative to the most positive. Left end right end rounded surface

cylinder 1: $+2 \times 10^{-9}$ $+4 \times 10^{-9}$ -6×10^{-9}

cylinder 2: $+3 \times 10^{-9}$ -2×10^{-9} $+6 \times 10^{-9}$

cylinder 3: -2×10^{-9} -5×10^{-9} $+3 \times 10^{-9}$

cylinder 4: $+2 \times 10^{-9}$ -5×10^{-9} -3×10^{-9}

- ▶ 1, 2, 3, 4
- ▶ 4, 3, 2, 1
- ▶ 3, 4, 2, 1
- ▶ **4, 3, 1, 2**

A conducting sphere of radius 0.01m has a charge of $1.0 \times 10^{-9}\text{ C}$ deposited on it. The magnitude of the electric field in N/C just outside the surface of the sphere is:

- ▶ 0

- ▶ 450
- ▶ **900**
- ▶ 4500

A round wastepaper basket with a 0.15-m radius opening is in a uniform electric field of 300N/C, perpendicular to the opening. The total flux through the sides and bottom, in $\text{N} \cdot \text{m}^2/\text{C}$, is:

- ▶ 0
- ▶ 4.2
- ▶ **21**
- ▶ 280

10C of charge are placed on a spherical conducting shell. A particle with a charge of -3C is placed at the center of the cavity. The net charge on the inner surface of the shell is:

- ▶ -7C
- ▶ -3C
- ▶ 0C
- ▶ **$+3\text{C}$**

10C of charge are placed on a spherical conducting shell. A particle with a charge of -3C is placed at the center of the cavity. The net charge on the outer surface of the shell is:

- ▶ -7C
- ▶ -3C

► 0C

► +7C

Charge Q is distributed uniformly throughout an insulating sphere of radius R .

The magnitude of the electric field at a point $R/2$ from the center is:

► $Q/4\pi\epsilon_0 R^2$

► $Q/\pi\epsilon_0 R^2$

► $3Q/4\pi\epsilon_0 R^2$

► $Q/8\pi\epsilon_0 R^2$

Positive charge Q is distributed uniformly throughout an insulating sphere of radius R , centered at the origin. A particle with positive charge Q is placed at $x = 2R$ on the x axis. The magnitude of the electric field at $x = R/2$ on the x axis is:

► $Q/4\pi\epsilon_0 R^2$

► $Q/8\pi\epsilon_0 R^2$

► $Q/72\pi\epsilon_0 R^2$

► $17Q/72\pi\epsilon_0 R^2$

Charge Q is distributed uniformly throughout a spherical insulating shell. The net electric flux in $\text{N} \cdot \text{m}^2 / \text{C}$ through the inner surface of the shell is:

► 0

► $Q/0$

► $2Q/0$

► $Q/4\pi\epsilon_0$

Charge Q is distributed uniformly throughout a spherical insulating shell. The net electric flux in $\text{N} \cdot \text{m}^2 / \text{C}$ through the outer surface of the shell is:

- ▶ 0
- ▶ **$Q/0$**
- ▶ $2Q/0$
- ▶ $Q/40$

A 3.5-cm radius hemisphere contains a total charge of $6.6 \times 10^{-7} \text{ C}$. The flux through the rounded portion of the surface is $9.8 \times 10^4 \text{ N} \cdot \text{m}^2 / \text{C}$. The flux through the flat base is:

- ▶ 0
- ▶ $+2.3 \times 10^4 \text{ N} \cdot \text{m}^2 / \text{C}$
- ▶ **$-2.3 \times 10^4 \text{ N} \cdot \text{m}^2 / \text{C}$**
- ▶ $-9.8 \times 10^4 \text{ N} \cdot \text{m}^2 / \text{C}$

Charge is distributed uniformly along a long straight wire. The electric field 2 cm from the wire is 20 N/C . The electric field 4 cm from the wire is:

- ▶ 120 N/C
- ▶ 80 N/C
- ▶ 40 N/C
- ▶ **10 N/C**

Positive charge Q is placed on a conducting spherical shell with inner radius R_1 and outer radius R_2 . A point charge q is placed at the center of the cavity. The

magnitude of the electric field at a point outside the shell, a distance r from the center, is:

- ▶ zero
- ▶ $Q/4\pi\epsilon_0 r^2$
- ▶ $q/4\pi\epsilon_0 r^2$
- ▶ **$(q + Q)/4\pi\epsilon_0 r^2$**

Positive charge Q is placed on a conducting spherical shell with inner radius R_1 and outer radius R_2 . A point charge q is placed at the center of the cavity. The magnitude of the electric field produced by the charge on the inner surface at a point in the interior of the conductor, a distance r from the center, is:

- ▶ 0
- ▶ $Q/4\pi\epsilon_0 R_2^2$
- ▶ $Q/4\pi\epsilon_0 R_1^2$
- ▶ **$q/4\pi\epsilon_0 r^2$**
- ▶ $Q/4\pi\epsilon_0 r^2$

A long line of charge with λ charge per unit length runs along the cylindrical axis of a cylindrical shell which carries a charge per unit length of λ_c . The charge per unit length on the inner and outer surfaces of the shell, respectively are:

- ▶ λ and λ_c
- ▶ **$-\lambda$ and $\lambda_c + \lambda$**
- ▶ $-\lambda$ and $\lambda_c - \lambda$
- ▶ $\lambda + \lambda_c$ and $\lambda_c - \lambda$

Charge is distributed uniformly on the surface of a large flat plate. The electric field 2 cm from the plate is 30N/C. The electric field 4 cm from the plate is:

- ▶ 120N/C
- ▶ 80N/C
- ▶ **30N/C**
- ▶ 15N/C

A particle with charge Q is placed outside a large neutral conducting sheet. At any point in the interior of the sheet the electric field produced by charges on the surface is directed:

- ▶ toward the surface
- ▶ away from the surface
- ▶ **toward Q**
- ▶ away from Q

A hollow conductor is positively charged. A small uncharged metal ball is lowered by a silk thread through a small opening in the top of the conductor and allowed to touch its inner surface. After the ball is removed, it will have:

- ▶ a positive charge
- ▶ a negative charge
- ▶ **no appreciable charge**
- ▶ a charge whose sign depends on what part of the inner surface it touched

A spherical conducting shell has charge Q . A particle with charge q is placed at the center of the cavity. The charge on the inner surface of the shell and the charge on the outer surface of the shell, respectively, are:

- ▶ $0, Q$
- ▶ $q, Q - q$
- ▶ **$-q, Q + q$**
- ▶ $-q, 0$

A particle with a charge of $5.5 \times 10^{-8} \text{ C}$ is 3.5 cm from a particle with a charge of $-2.3 \times 10^{-8} \text{ C}$. The potential energy of this two-particle system, relative to the potential energy at infinite separation, is:

- ▶ $3.2 \times 10^{-4} \text{ J}$
- ▶ **$-3.2 \times 10^{-4} \text{ J}$**
- ▶ $9.3 \times 10^{-3} \text{ J}$
- ▶ $-9.3 \times 10^{-3} \text{ J}$

A particle with a charge of $5.5 \times 10^{-8} \text{ C}$ is fixed at the origin. A particle with a charge of $-2.3 \times 10^{-8} \text{ C}$ is moved from $x = 3.5 \text{ cm}$ on the x axis to $y = 4.3 \text{ cm}$ on the y axis. The change in potential energy of the two-particle system is:

- ▶ $3.1 \times 10^{-3} \text{ J}$
- ▶ $-3.1 \times 10^{-3} \text{ J}$
- ▶ **$6.0 \times 10^{-5} \text{ J}$**
- ▶ $-6.0 \times 10^{-5} \text{ J}$

A particle with a charge of $5.5 \times 10^{-8} \text{ C}$ is fixed at the origin. A particle with a charge of $-2.3 \times 10^{-8} \text{ C}$ is moved from $x = 3.5 \text{ cm}$ on the x axis to $y = 3.5 \text{ cm}$ on the y axis. The change in the potential energy of the two-particle system is:

- ▶ $3.2 \times 10^{-4} \text{ J}$
- ▶ $-3.2 \times 10^{-4} \text{ J}$
- ▶ $9.3 \times 10^{-3} \text{ J}$
- ▶ **0**

Three particles lie on the x axis: particle 1, with a charge of $1 \times 10^{-8} \text{ C}$ is at $x = 1 \text{ cm}$, particle 2, with a charge of $2 \times 10^{-8} \text{ C}$, is at $x = 2 \text{ cm}$, and particle 3, with a charge of $-3 \times 10^{-8} \text{ C}$, is at $x = 3 \text{ cm}$. The potential energy of this arrangement, relative to the potential energy for infinite separation, is:

- ▶ $+4.9 \times 10^{-4} \text{ J}$
- ▶ **$-4.9 \times 10^{-4} \text{ J}$**
- ▶ $+8.5 \times 10^{-4} \text{ J}$
- ▶ $-8.5 \times 10^{-4} \text{ J}$

Two identical particles, each with charge q , are placed on the x axis, one at the origin and the other at $x = 5 \text{ cm}$. A third particle, with charge $-q$, is placed on the x axis so the potential energy of the three-particle system is the same as the potential energy at infinite separation. Its x coordinate is:

- ▶ **13 cm**
- ▶ 2.5 cm

- ▶ 7.5 cm
- ▶ 10 cm

Choose the correct statement:

- ▶ The potential of a negatively charged conductor must be negative
- ▶ If $E = 0$ at a point P then V must be zero at P
- ▶ If $V = 0$ at a point P then E must be zero at P
- ▶ **None of the above are correct**

If 500 J of work are required to carry a charged particle between two points with a potential difference of 20V, the magnitude of the charge on the particle is:

- ▶ **12.5C**
- ▶ 20C
- ▶ cannot be computed unless the path is given
- ▶ none of these

The potential difference between two points is 100V. If a particle with a charge of 2C is transported from one of these points to the other, the magnitude of the work done is:

- ▶ **200 J**
- ▶ 100 J
- ▶ 50 J
- ▶ 100 J

Two large parallel conducting plates are separated by a distance d , placed in a vacuum, and connected to a source of potential difference V . An oxygen ion, with charge $2e$, starts from rest on the surface of one plate and accelerates to the other. If e denotes the magnitude of the electron charge, the final kinetic energy of this ion is:

- ▶ $eV/2$
- ▶ eV/d
- ▶ $eV d$
- ▶ **$2eV$**

An electron volt is :

- ▶ the force acting on an electron in a field of 1N/C
- ▶ the force required to move an electron 1 meter
- ▶ **the energy gained by an electron in moving through a potential**

difference of 1 volt

- ▶ the energy needed to move an electron through 1 meter in any electric field

An electron has charge $-e$ and mass m_e . A proton has charge e and mass $1840m_e$. A “proton volt” is equal to:

- ▶ **1 eV**
- ▶ 1840 eV
- ▶ $(1/1840)\text{ eV}$
- ▶ $\sqrt{1840}\text{ eV}$

Two conducting spheres are far apart. The smaller sphere carries a total charge Q . The larger sphere has a radius that is twice that of the smaller and is neutral. After the two spheres are connected by a conducting wire, the charges on the smaller and larger spheres, respectively, are:

- ▶ $Q/2$ and $Q/2$
- ▶ **$Q/3$ and $2Q/3$**
- ▶ $2Q/3$ and $Q/3$
- ▶ zero and Q

A conducting sphere with radius R is charged until the magnitude of the electric field just outside its surface is E . The electric potential of the sphere, relative to the potential far away, is:

- ▶ zero
- ▶ E/R
- ▶ E/R^2
- ▶ **ER**

A 5-cm radius conducting sphere has a surface charge density of $2 \times 10^{-6} \text{ C/m}^2$ on its surface. Its electric potential, relative to the potential far away, is:

- ▶ **$1.1 \times 10^4 \text{ V}$**
- ▶ $2.2 \times 10^4 \text{ V}$
- ▶ $2.3 \times 10^5 \text{ V}$
- ▶ $3.6 \times 10^5 \text{ V}$

A hollow metal sphere is charged to a potential V . The potential at its center is:

- ▶ V
- ▶ 0
- ▶ $-V$
- ▶ $2V$

Questions:

1. Consider a lamp hanging from a chain. What is the tension in the chain?
2. A proton travels with a speed of 3.00×10^6 m/s at an angle of 37.0° with the direction of a magnetic field of 0.300 T in the $+y$ direction. What are (a) the magnitude of the magnetic force on the proton and (b) its acceleration?
3. Light from the Sun takes approximately 8.3 min to reach the Earth. During this time interval the Earth has continued to rotate on its axis. How far is the actual direction of the Sun from its image in the sky?
4. Do all current-carrying conductors emit electromagnetic waves? Explain
5. Explain solar convection zone. What is its other name?
6. 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?
7. Can all gas molecules in the vessel have the same speed?
8. What are the properties of wave function?
9. 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.

10. 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 ?

VU Insider

Positive charge is distributed uniformly throughout a non-conducting sphere.

The highest electric potential occurs:

- ▶ **at the center**
- ▶ at the surface
- ▶ halfway between the center and surface
- ▶ just outside the surface

A total charge of $7 \times 10^{-8} \text{ C}$ 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:

- ▶ $-1.3 \times 10^4 \text{ V}$
- ▶ **$1.3 \times 10^4 \text{ V}$**
- ▶ $7.0 \times 10^5 \text{ V}$
- ▶ $-6.3 \times 10^4 \text{ V}$

Eight identical spherical raindrops are each at a potential V , relative to the potential far away. They coalesce to make one spherical raindrop whose potential is:

- ▶ $V/8$
- ▶ $V/2$
- ▶ $2V$
- ▶ **$4V$**

A metal sphere carries a charge of $5 \times 10^{-9} \text{ C}$ and is at a potential of 400V, relative to the potential far away. The potential at the center of the sphere is:

- ▶ **400V**
- ▶ -400V
- ▶ $2 \times 10^{-6} \text{ V}$
- ▶ 0

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:

- ▶ $+2.2 \times 10^{-7} \text{ C/m}^2$
- ▶ $-2.2 \times 10^{-7} \text{ C/m}^2$
- ▶ $+3.5 \times 10^{-7} \text{ C/m}^2$
- ▶ **$+1.8 \times 10^{-8} \text{ C/m}^2$**

A conducting sphere has charge Q and its electric potential is V , relative to the potential far away. If the charge is doubled to 2Q, the potential is:

- ▶ V
- ▶ **2V**
- ▶ 4V
- ▶ $V/4$

The potential difference between the ends of a 2-meter stick that is parallel to a uniform electric field is 400V. The magnitude of the electric field is:

- ▶ zero
- ▶ 100V/m
- ▶ 200V/m
- ▶ **800V/m**

In a certain region of space the electric potential increases uniformly from east to west and does not vary in any other direction. The electric field:

- ▶ points east and varies with position
- ▶ **points east and does not vary with position**
- ▶ points west and varies with position
- ▶ points west and does not vary with position

If the electric field is in the positive x direction and has a magnitude given by $E = Cx^2$, where C is a constant, then the electric potential is given by $V =$:

- ▶ $2Cx$
- ▶ $-2Cx$
- ▶ $Cx^3/3$
- ▶ **$-Cx^3/3$**

The work required to carry a particle with a charge of $6.0C$ from a 5.0-V equipotential surface to a 6.0-V equipotential surface and back again to the 5.0-V surface is:

- ▶ **0**
- ▶ $1.2 \times 10^{-5} \text{ J}$
- ▶ $3.0 \times 10^{-5} \text{ J}$
- ▶ $6.0 \times 10^{-5} \text{ J}$

The equipotential surfaces associated with a charged point particles are:

- ▶ radially outward from the particle
- ▶ vertical planes

- ▶ horizontal planes
- ▶ **concentric spheres centered at the particle**

The electric field in a region around the origin is given by $E = C(x\hat{i} + y\hat{j})$, where C is a constant. The equipotential surfaces in that region are:

- ▶ **concentric cylinders with axes along the z axis**
- ▶ concentric cylinders with axes along the x axis
- ▶ concentric spheres centered at the origin
- ▶ planes parallel to the xy plane

A particle with charge q is to be brought from far away to a point near an electric dipole. No work is done if the final position of the particle is on:

- ▶ the line through the charges of the dipole
- ▶ **a line that is perpendicular to the dipole moment**
- ▶ a line that makes an angle of 45° with the dipole moment
- ▶ a line that makes an angle of 30° with the dipole moment

Equipotential surfaces associated with an electric dipole are:

- ▶ spheres centered on the dipole
- ▶ cylinders with axes along the dipole moment
- ▶ planes perpendicular to the dipole moment
- ▶ **none of the above**

The units of capacitance are equivalent to:

- ▶ J/C
- ▶ V/C

- ▶ J^2/C
- ▶ **C^2/J**

A farad is the same as a:

- ▶ J/V
- ▶ V/J
- ▶ **C/V**
- ▶ V/C

A capacitor C “has a charge Q ”. The actual charges on its plates are:

- ▶ Q, Q
- ▶ $Q/2, Q/2$
- ▶ **$Q, -Q$**
- ▶ $Q/2, -Q/2$

Each plate of a capacitor stores a charge of magnitude 1mC when a 100-V potential difference is applied. The capacitance is:

- ▶ $5\ \mu\text{F}$
- ▶ **$10\ \mu\text{F}$**
- ▶ $50\ \mu\text{F}$
- ▶ $100\ \mu\text{F}$

To charge a 1-F capacitor with 2C requires a potential difference of:

- ▶ **2V**
- ▶ 0.2V
- ▶ 5V

- ▶ 0.5V

The capacitance of a parallel-plate capacitor with plate area A and plate separation d is given by:

- ▶ $0d/A$
- ▶ $0d/2A$
- ▶ **$0A/d$**
- ▶ $0A/2d$

The capacitance of a parallel-plate capacitor is:

- ▶ **proportional to the plate area**
- ▶ proportional to the charge stored
- ▶ independent of any material inserted between the plates
- ▶ proportional to the potential difference of the plates

The capacitance of a parallel-plate capacitor can be increased by:

- ▶ increasing the charge
- ▶ decreasing the charge
- ▶ increasing the plate separation
- ▶ **decreasing the plate separation**

If both the plate area and the plate separation of a parallel-plate capacitor are doubled, the capacitance is:

- ▶ doubled
- ▶ halved
- ▶ **unchanged**

- ▶ tripled

If the plate area of an isolated charged parallel-plate capacitor is doubled:

- ▶ the electric field is doubled
- ▶ **the potential difference is halved**
- ▶ the charge on each plate is halved
- ▶ the surface charge density on each plate is doubled

If the plate separation of an isolated charged parallel-plate capacitor is doubled:

- ▶ the electric field is doubled
- ▶ the potential difference is halved
- ▶ the charge on each plate is halved
- ▶ **none of the above**

Pulling the plates of an isolated charged capacitor apart:

- ▶ increases the capacitance
- ▶ **increases the potential difference**
- ▶ does not affect the potential difference
- ▶ decreases the potential difference

If the charge on a parallel-plate capacitor is doubled:

- ▶ the capacitance is halved
- ▶ the capacitance is doubled
- ▶ the electric field is halved
- ▶ **the electric field is doubled**

A parallel-plate capacitor has a plate area of 0.2m^2 and a plate separation of 0.1mm . To obtain an electric field of $2.0 \times 10^6 \text{ V/m}$ between the plates, the magnitude of the charge on each plate should be:

- ▶ $8.9 \times 10^{-7} \text{ C}$
- ▶ $1.8 \times 10^{-6} \text{ C}$
- ▶ $3.5 \times 10^{-6} \text{ C}$
- ▶ **$7.1 \times 10^{-6} \text{ C}$**

A parallel-plate capacitor has a plate area of 0.2m^2 and a plate separation of 0.1mm . If the charge on each plate has a magnitude of $4 \times 10^{-6} \text{ C}$ the potential difference across the plates is approximately:

- ▶ 0
- ▶ $4 \times 10^{-2} \text{ V}$
- ▶ $1 \times 10^2 \text{ V}$
- ▶ **$2 \times 10^2 \text{ V}$**

The capacitance of a spherical capacitor with inner radius a and outer radius b is proportional to:

- ▶ a/b
- ▶ $b - a$
- ▶ $b^2 - a^2$
- ▶ **$ab/(b - a)$**

The capacitance of a single isolated spherical conductor with radius R is proportional to:

- ▶ **R**
- ▶ R^2
- ▶ $1/R$
- ▶ $1/R^2$

The capacitance of a cylindrical capacitor can be increased by:

- ▶ decreasing both the radius of the inner cylinder and the length
- ▶ **increasing both the radius of the inner cylinder and the length**
- ▶ increasing the radius of the outer cylindrical shell and decreasing the

length

- ▶ only by decreasing the length

A battery is used to charge a series combination of two identical capacitors. If the potential difference across the battery terminals is V and total charge Q flows through the battery during the charging process then the charge on the positive plate of each capacitor and the potential difference across each capacitor are:

- ▶ $Q/2$ and $V/2$, respectively
- ▶ Q and V , respectively
- ▶ $Q/2$ and V , respectively
- ▶ **Q and $V/2$, respectively**

A battery is used to charge a parallel combination of two identical capacitors. If the potential difference across the battery terminals is V and total charge Q flows through the battery during the charging process then the charge on the

positive plate of each capacitor and the potential difference across each capacitor are:

- ▶ $Q/2$ and $V/2$, respectively
- ▶ Q and V , respectively
- ▶ **$Q/2$ and V , respectively**
- ▶ Q and $V/2$, respectively

A $2\text{-}\mu\text{F}$ and a $1\text{-}\mu\text{F}$ capacitor are connected in series and a potential difference is applied across the combination. The $2\text{-}\mu\text{F}$ capacitor has:

- ▶ twice the charge of the $1\text{-}\mu\text{F}$ capacitor
- ▶ half the charge of the $1\text{-}\mu\text{F}$ capacitor
- ▶ twice the potential difference of the $1\text{-}\mu\text{F}$ capacitor
- ▶ **half the potential difference of the $1\text{-}\mu\text{F}$ capacitor**

A $2\text{-}\mu\text{F}$ and a $1\text{-}\mu\text{F}$ capacitor are connected in parallel and a potential difference is applied across the combination. The $2\text{-}\mu\text{F}$ capacitor has:

- ▶ **twice the charge of the $1\text{-}\mu\text{F}$ capacitor**
- ▶ half the charge of the $1\text{-}\mu\text{F}$ capacitor
- ▶ twice the potential difference of the $1\text{-}\mu\text{F}$ capacitor
- ▶ half the potential difference of the $1\text{-}\mu\text{F}$ capacitor

Let Q denote charge, V denote potential difference, and U denote stored energy. Of these quantities, capacitors in series must have the same:

- ▶ **Q only**
- ▶ V only

- ▶ U only
- ▶ Q and U only

Let Q denote charge, V denote potential difference, and U denote stored energy. Of these quantities, capacitors in parallel must have the same:

- ▶ Q only
- ▶ **V only**
- ▶ U only
- ▶ Q and U only

Capacitors C1 and C2 are connected in parallel. The equivalent capacitance is given by:

- ▶ $C_1 C_2 / (C_1 + C_2)$
- ▶ $(C_1 + C_2) / C_1 C_2$
- ▶ C_1 / C_2
- ▶ **$C_1 + C_2$**

Capacitors C1 and C2 are connected in series. The equivalent capacitance is given by:

- ▶ **$C_1 C_2 / (C_1 + C_2)$**
- ▶ $(C_1 + C_2) / C_1 C_2$
- ▶ $1 / (C_1 + C_2)$
- ▶ C_1 / C_2

Capacitors C1 and C2 are connected in series and a potential difference is applied to the combination. If the capacitor that is equivalent to the

combination has the same potential difference, then the charge on the equivalent capacitor is the same as:

- ▶ **the charge on C1**
- ▶ the sum of the charges on C1 and C2
- ▶ the difference of the charges on C1 and C2
- ▶ the product of the charges on C1 and C2

Questions:

1. 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.
2. Who discover the nucleus? Write the experimental setup that he follows.
3. In an analogy between electric current and automobile traffic flow, what would correspond to charge? What would correspond to current?
4. (a) When can you expect a body to emit blackbody radiation?
(b) Which law is obeyed by Sun and other stars, briefly explain it.

5. 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.
6. 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?
7. You want to explore the shape of a certain molecule by scattering electrons of momentum p from a gas of the molecules and studying the deflection of the electrons.
8. You will be able to see finer details in the molecules by (a) increasing p ; (b) decreasing p ; (c) not worrying what p is.
9. A vessel is filled with gas at some equilibrium pressure and temperature. Can all gas molecules in the vessel have the same speed?
10. What are the properties of wave function?

As a 2.0-kg block travels around a 0.50-m radius circle it has an angular speed of 12 rad/s. The circle is parallel to the xy plane and is centered on the z axis, a distance of 0.75m from the origin. The z component of the angular momentum around the origin is:

- ▶ 6.0kg · m²/s
- ▶ 9.0kg · m²/s
- ▶ 11 kg · m²/s
- ▶ 14 kg · m²/s

A net torque applied to a rigid object always tends to produce:

- ▶ linear acceleration
- ▶ rotational equilibrium
- ▶ angular acceleration
- ▶ rotational inertia

An object attached to one end of a spring makes 20 vibrations in 10 s. Its angular frequency is:

- ▶ 1.57 rad/s
- ▶ 2.0 rad/s
- ▶ 6.3 rad/s

In simple harmonic motion, the restoring force must be proportional to the:

- ▶ amplitude
- ▶ frequency
- ▶ velocity

► displacement

Mercury is a convenient liquid to use in a barometer because:

- it is a metal
- it has a high boiling point
- it expands little with temperature

► it has a high density

The units of the electric field are:

- J/m
- J/(C·m)
- J/C
- J·C

A farad is the same as a

- J/V
- V/J
- C/V
- V/C

We desire to make an LC circuit that oscillates at 100 Hz using an inductance of 2.5H. We also need a capacitance of:

- 1 F
- 1mF
- 1 μ F
- 100 μ F

The wavelength of red light is 700 nm. Its frequency is _____.

- ▶ 4.30×10^4 Hertz
- ▶ 4.30×10^3 Hertz
- ▶ **4.30×10^5 Hertz**
- ▶ 4.30×10^2 Hertz

Which of the following statements is NOT TRUE about electromagnetic waves?

- ▶ Electromagnetic waves satisfy the Maswell's Equation.
- ▶ Electromagnetic waves can not travel through space.
- ▶ The receptions of electromagnetic waves require an antenna.
- ▶ **The electromagnetic radiation from a burning candle is unpolarized.**

Radio waves and light waves are _____.

- ▶ Longitudinal waves
- ▶ Transverse waves
- ▶ **Electromagnetic and transverse both**
- ▶ Electromagnetic and longitudinal both

Wien's Law states that, $\lambda_{max} =$ _____ K.

- ▶ 2.90×10^{-3} Hertz
- ▶ 2.90×10^{-3} s
- ▶ 2.90×10^{-3} kg
- ▶ **2.90×10^{-3} m**

Interference of light is evidence that:

- ▶ the speed of light is very large

- ▶ light is a transverse wave
- ▶ **light is a wave phenomenon**
- ▶ light is electromagnetic in character

Fahrenheit and Kelvin scales agree numerically at a reading of:

- ▶ **-40**
- ▶ 0
- ▶ 273
- ▶ 574

According to the theory of relativity:

- ▶ **moving clocks run fast**
- ▶ energy is not conserved in high speed collisions
- ▶ the speed of light must be measured relative to the ether
- ▶ none of the above are true

Light from a stationary spaceship is observed, and then the spaceship moves directly away from the observer at high speed while still emitting the light. As a result, the light seen by the observer has:

- ▶ higher frequency and a longer wavelength than before
- ▶ **lower frequency and a shorter wavelength than before**
- ▶ higher frequency and a shorter wavelength than before
- ▶ lower frequency and a longer wavelength than before

How fast should you move away from a 6.0×10^{14} Hz light source to observe waves with a frequency of 4.0×10^{14} Hz?

- ▶ 20c
- ▶ **38c**
- ▶ 45c
- ▶ 51c

The quantum number n is most closely associated with what property of the electron in a hydrogen atom?

- ▶ **Energy**
- ▶ Orbital angular momentum
- ▶ Spin angular momentum
- ▶ Magnetic moment

The quantum number m_s is most closely associated with what property of the electron in an atom?

- ▶ Magnitude of the orbital angular momentum
- ▶ **Energy**
- ▶ z component of the spin angular momentum
- ▶ z component of the orbital angular momentum

As the wavelength of a wave in a uniform medium increases, its speed will

_____.

- ▶ Decrease
- ▶ Increase
- ▶ **Remain the same**
- ▶ None of these

The number of significant figures in 0.00150 is:

- ▶ 5
- ▶ 4
- ▶ 3
- ▶ 2

For a body to be in equilibrium under the combined action of several forces:

- ▶ All the forces must be applied at the same point
- ▶ all of the forces form pairs of equal and opposite forces
- ▶ any two of these forces must be balanced by a third force
- ▶ the sum of the torques about any point must equal zero

A bucket of water is pushed from left to right with increasing speed across a horizontal surface. Consider the pressure at two points at the same level in the water.

- ▶ It is the same
- ▶ It is higher at the point on the left
- ▶ It is higher at the point on the right
- ▶ At first it is higher at the point on the left but as the bucket speeds up it is

lower there

An organ pipe with both ends open is 0.85m long. Assuming that the speed of sound is 340m/s, the frequency of the third harmonic of this pipe is:

- ▶ 200 Hz
- ▶ 300 Hz

▶ 400 Hz

▶ 600 Hz

Capacitors C1 and C2 are connected in series. The equivalent capacitance is given by

▶ $C_1 C_2 / (C_1 + C_2)$

▶ $(C_1 + C_2) / C_1 C_2$

▶ $1 / (C_1 + C_2)$

▶ C_1 / C_2

If the potential difference across a resistor is doubled:

▶ only the current is doubled

▶ only the current is halved

▶ only the resistance is doubled

▶ only the resistance is halved

By using only two resistors, R1 and R2, a student is able to obtain resistances of 3 Ω , 4 Ω , 12 Ω , and 16 Ω . The values of R1 and R2 (in ohms) are:

▶ 3, 4

▶ 2, 12

▶ 3, 16

▶ 4, 12

Faraday's law states that an induced emf is proportional to:

▶ the rate of change of the electric field

▶ the rate of change of the magnetic flux

- ▶ the rate of change of the electric flux
- ▶ the rate of change of the magnetic field

A generator supplies 100V to the primary coil of a transformer. The primary has 50 turns and the secondary has 500 turns. The secondary voltage is:

- ▶ 1000V
- ▶ 500V
- ▶ 250V
- ▶ 100V

Which of the following electromagnetic radiations has photons with the greatest energy?

- ▶ blue light
- ▶ yellow light
- ▶ x rays
- ▶ radio waves

A virtual image is one:

- ▶ toward which light rays converge but do not pass through
- ▶ from which light rays diverge as they pass through
- ▶ toward which light rays converge and pass through
- ▶ from which light rays diverge but do not pass through

What is the unit of magnification factor?

- ▶ meter.Kelvin
- ▶ radian.Kelvin

- ▶ degree.Kelvin
- ▶ no units

During an adiabatic process an object does 100 J of work and its temperature decreases by 5K. During another process it does 25 J of work and its temperature decreases by 5 K. Its heat capacity for the second process is.

- ▶ 20 J/K
- ▶ 100 J/K
- ▶ 15 J/K
- ▶ 5 J/K

An ideal gas expands into a vacuum in a rigid vessel. As a result there is:

- ▶ a change in entropy
- ▶ a decrease of internal energy
- ▶ an increase of pressure
- ▶ a change in temperature

The Stern-Gerlach experiment makes use of:

- ▶ a strong uniform magnetic field
- ▶ a strong non-uniform magnetic field
- ▶ a strong uniform electric field
- ▶ a strong non-uniform electric field

A large collection of nuclei are undergoing alpha decay. The rate of decay at any instant is proportional to:

- ▶ the number of undecayed nuclei present at that instant

- ▶ the time since the decays started
- ▶ the time remaining before all have decayed
- ▶ the half-life of the decay

Consider Gauss's law: $\oint \mathbf{E} \cdot d\mathbf{A} = q/\epsilon_0$. Which of the following is true?

- ▶ E must be the electric field due to the enclosed charge
- ▶ If $q = 0$, then $E = 0$ everywhere on the Gaussian surface
- ▶ If the three particles inside have charges of $+q$, $+q$, and $-2q$, then the integral is zero
- ▶ on the surface E is everywhere parallel to $d\mathbf{A}$

A charged point particle is placed at the center of a spherical Gaussian surface.

The electric flux Φ_E is changed if:

- ▶ the sphere is replaced by a cube of the same volume
- ▶ the sphere is replaced by a cube of one-tenth the volume
- ▶ the point charge is moved off center (but still inside the original sphere)
- ▶ the point charge is moved to just outside the sphere

Choose the INCORRECT statement:

- ▶ Gauss' law can be derived from Coulomb's law
- ▶ Gauss' law states that the net number of lines crossing any closed surface in an outward direction is proportional to the net charge enclosed within the surface
- ▶ Coulomb's law can be derived from Gauss' law and symmetry

► According to Gauss' law, if a closed surface encloses no charge, then the electric field must vanish everywhere on the surface

The outer surface of the cardboard center of a paper towel roll:

- is a possible Gaussian surface
- cannot be a Gaussian surface because it encloses no charge
- cannot be a Gaussian surface since it is an insulator
- cannot be a Gaussian surface because it is not a closed surface

A physics instructor in an anteroom charges an electrostatic generator to $25 \mu\text{C}$, then carries it into the lecture hall. The net electric flux in $\text{N} \cdot \text{m}^2/\text{C}$ through the lecture hall walls is:

- 0
- 25×10^{-6}
- 2.2×10^5
- 2.8×10^6

A point particle with charge q is placed inside the cube but not at its center. The electric flux through any one side of the cube:

- is zero
- is $q/0$
- is $q/60$
- cannot be computed using Gauss' law

A particle with charge $5.0\text{-}\mu\text{C}$ is placed at the corner of a cube. The total electric flux in $\text{N} \cdot \text{m}^2/\text{C}$ through all sides of the cube is:

- ▶ 0
- ▶ 7.1×10^4
- ▶ 9.4×10^4
- ▶ **5.6×10^5**

14. A point particle with charge q is at the center of a Gaussian surface in the form of a cube. The electric flux through any one face of the cube is:

- ▶ $q/0$
- ▶ $q/4\pi\epsilon_0$
- ▶ $q/30$
- ▶ **$q/60$**

The table below gives the electric flux in $\text{N}\cdot\text{m}^2/\text{C}$ through the ends and round surfaces of four Gaussian surfaces in the form of cylinders. Rank the cylinders according to the charge inside, from the most negative to the most positive. Left end right end rounded surface

cylinder 1: $+2 \times 10^{-9}$ $+4 \times 10^{-9}$ -6×10^{-9}

cylinder 2: $+3 \times 10^{-9}$ -2×10^{-9} $+6 \times 10^{-9}$

cylinder 3: -2×10^{-9} -5×10^{-9} $+3 \times 10^{-9}$

cylinder 4: $+2 \times 10^{-9}$ -5×10^{-9} -3×10^{-9}

- ▶ 1, 2, 3, 4
- ▶ 4, 3, 2, 1
- ▶ 3, 4, 2, 1
- ▶ **4, 3, 1, 2**

A conducting sphere of radius 0.01m has a charge of 1.0×10^{-9} C deposited on it. The magnitude of the electric field in N/C just outside the surface of the sphere is:

- ▶ 0
- ▶ 450
- ▶ **900**
- ▶ 4500

A round wastepaper basket with a 0.15-m radius opening is in a uniform electric field of 300N/C, perpendicular to the opening. The total flux through the sides and bottom, in $\text{N} \cdot \text{m}^2/\text{C}$, is:

- ▶ 0
- ▶ 4.2
- ▶ **21**
- ▶ 280

10C of charge are placed on a spherical conducting shell. A particle with a charge of -3C is placed at the center of the cavity. The net charge on the inner surface of the shell is:

- ▶ -7C
- ▶ -3C
- ▶ 0C
- ▶ **$+3\text{C}$**

10C of charge are placed on a spherical conducting shell. A particle with a charge of $-3C$ is placed at the center of the cavity. The net charge on the outer surface of the shell is:

- ▶ $-7C$
- ▶ $-3C$
- ▶ $0C$
- ▶ **$+7C$**

Charge Q is distributed uniformly throughout an insulating sphere of radius R .

The magnitude of the electric field at a point $R/2$ from the center is:

- ▶ $Q/4\pi\epsilon_0 R^2$
- ▶ $Q/\pi\epsilon_0 R^2$
- ▶ $3Q/4\pi\epsilon_0 R^2$
- ▶ **$Q/8\pi\epsilon_0 R^2$**

Positive charge Q is distributed uniformly throughout an insulating sphere of radius R , centered at the origin. A particle with positive charge Q is placed at $x = 2R$ on the x axis. The magnitude of the electric field at $x = R/2$ on the x axis is:

- ▶ $Q/4\pi\epsilon_0 R^2$
- ▶ $Q/8\pi\epsilon_0 R^2$
- ▶ **$Q/72\pi\epsilon_0 R^2$**
- ▶ $17Q/72\pi\epsilon_0 R^2$

Charge Q is distributed uniformly throughout a spherical insulating shell. The net electric flux in $N \cdot m^2 / C$ through the inner surface of the shell is:

- ▶ 0
- ▶ $Q/0$
- ▶ $2Q/0$
- ▶ $Q/4\pi 0$

Charge Q is distributed uniformly throughout a spherical insulating shell. The net electric flux in $\text{N} \cdot \text{m}^2 / \text{C}$ through the outer surface of the shell is:

- ▶ 0
- ▶ $Q/0$
- ▶ $2Q/0$
- ▶ $Q/40$

A 3.5-cm radius hemisphere contains a total charge of $6.6 \times 10^{-7} \text{ C}$. The flux through the rounded portion of the surface is $9.8 \times 10^4 \text{ N} \cdot \text{m}^2 / \text{C}$. The flux through the flat base is:

- ▶ 0
- ▶ $+2.3 \times 10^4 \text{ N} \cdot \text{m}^2 / \text{C}$
- ▶ $-2.3 \times 10^4 \text{ N} \cdot \text{m}^2 / \text{C}$
- ▶ $-9.8 \times 10^4 \text{ N} \cdot \text{m}^2 / \text{C}$

Charge is distributed uniformly along a long straight wire. The electric field 2 cm from the wire is 20 N/C . The electric field 4 cm from the wire is:

- ▶ 120 N/C
- ▶ 80 N/C
- ▶ 40 N/C

► 10N/C

Positive charge Q is placed on a conducting spherical shell with inner radius R_1 and outer radius R_2 . A point charge q is placed at the center of the cavity. The magnitude of the electric field at a point outside the shell, a distance r from the center, is:

► zero

► $Q/4\pi\epsilon_0 r^2$

► $q/4\pi\epsilon_0 r^2$

► $(q + Q)/4\pi\epsilon_0 r^2$

Positive charge Q is placed on a conducting spherical shell with inner radius R_1 and outer radius R_2 . A point charge q is placed at the center of the cavity. The magnitude of the electric field produced by the charge on the inner surface at a point in the interior of the conductor, a distance r from the center, is:

► 0

► $Q/4\pi\epsilon_0 R_2^2$

► $Q/4\pi\epsilon_0 R_1^2$

► $q/4\pi\epsilon_0 r^2$

► $Q/4\pi\epsilon_0 r^2$

A long line of charge with λ charge per unit length runs along the cylindrical axis of a cylindrical shell which carries a charge per unit length of λ_c . The charge per unit length on the inner and outer surfaces of the shell, respectively are:

► λ and λ_c

- ▶ **$-\lambda$ and $\lambda_c + \lambda$**
- ▶ $-\lambda$ and $\lambda_c - \lambda$
- ▶ $\lambda + \lambda_c$ and $\lambda_c - \lambda$

Charge is distributed uniformly on the surface of a large flat plate. The electric field 2 cm from the plate is 30N/C. The electric field 4 cm from the plate is:

- ▶ 120N/C
- ▶ 80N/C
- ▶ **30N/C**
- ▶ 15N/C

A particle with charge Q is placed outside a large neutral conducting sheet. At any point in the interior of the sheet the electric field produced by charges on the surface is directed:

- ▶ toward the surface
- ▶ away from the surface
- ▶ **toward Q**
- ▶ away from Q

A hollow conductor is positively charged. A small uncharged metal ball is lowered by a silk thread through a small opening in the top of the conductor and allowed to touch its inner surface. After the ball is removed, it will have:

- ▶ a positive charge
- ▶ a negative charge
- ▶ **no appreciable charge**

► a charge whose sign depends on what part of the inner surface it touched

A spherical conducting shell has charge Q . A particle with charge q is placed at the center of the cavity. The charge on the inner surface of the shell and the charge on the outer surface of the shell, respectively, are:

- 0, Q
- q , $Q - q$
- **$-q$, $Q + q$**
- $-q$, 0

A particle with a charge of $5.5 \times 10^{-8} \text{ C}$ is 3.5 cm from a particle with a charge of $-2.3 \times 10^{-8} \text{ C}$. The potential energy of this two-particle system, relative to the potential energy at infinite separation, is:

- $3.2 \times 10^{-4} \text{ J}$
- **$-3.2 \times 10^{-4} \text{ J}$**
- $9.3 \times 10^{-3} \text{ J}$
- $-9.3 \times 10^{-3} \text{ J}$

A particle with a charge of $5.5 \times 10^{-8} \text{ C}$ is fixed at the origin. A particle with a charge of $-2.3 \times 10^{-8} \text{ C}$ is moved from $x = 3.5 \text{ cm}$ on the x axis to $y = 4.3 \text{ cm}$ on the y axis. The change in potential energy of the two-particle system is:

- $3.1 \times 10^{-3} \text{ J}$
- $-3.1 \times 10^{-3} \text{ J}$
- **$6.0 \times 10^{-5} \text{ J}$**
- $-6.0 \times 10^{-5} \text{ J}$

A particle with a charge of $5.5 \times 10^{-8} \text{ C}$ is fixed at the origin. A particle with a charge of $-2.3 \times 10^{-8} \text{ C}$ is moved from $x = 3.5 \text{ cm}$ on the x axis to $y = 3.5 \text{ cm}$ on the y axis. The change in the potential energy of the two-particle system is:

- ▶ $3.2 \times 10^{-4} \text{ J}$
- ▶ $-3.2 \times 10^{-4} \text{ J}$
- ▶ $9.3 \times 10^{-3} \text{ J}$
- ▶ **0**

Three particles lie on the x axis: particle 1, with a charge of $1 \times 10^{-8} \text{ C}$ is at $x = 1 \text{ cm}$, particle 2, with a charge of $2 \times 10^{-8} \text{ C}$, is at $x = 2 \text{ cm}$, and particle 3, with a charge of $-3 \times 10^{-8} \text{ C}$, is at $x = 3 \text{ cm}$. The potential energy of this arrangement, relative to the potential energy for infinite separation, is:

- ▶ $+4.9 \times 10^{-4} \text{ J}$
- ▶ **$-4.9 \times 10^{-4} \text{ J}$**
- ▶ $+8.5 \times 10^{-4} \text{ J}$
- ▶ $-8.5 \times 10^{-4} \text{ J}$

Two identical particles, each with charge q , are placed on the x axis, one at the origin and the other at $x = 5 \text{ cm}$. A third particle, with charge $-q$, is placed on the x axis so the potential energy of the three-particle system is the same as the potential energy at infinite separation. Its x coordinate is:

- ▶ **13 cm**
- ▶ 2.5 cm

- ▶ 7.5 cm
- ▶ 10 cm

Choose the correct statement:

- ▶ The potential of a negatively charged conductor must be negative
- ▶ If $E = 0$ at a point P then V must be zero at P
- ▶ If $V = 0$ at a point P then E must be zero at P
- ▶ **None of the above are correct**

If 500 J of work are required to carry a charged particle between two points with a potential difference of 20V, the magnitude of the charge on the particle is:

- ▶ **12.5C**
- ▶ 20C
- ▶ cannot be computed unless the path is given
- ▶ none of these

The potential difference between two points is 100V. If a particle with a charge of 2C is transported from one of these points to the other, the magnitude of the work done is:

- ▶ **200 J**
- ▶ 100 J
- ▶ 50 J
- ▶ 100 J

Two large parallel conducting plates are separated by a distance d , placed in a vacuum, and connected to a source of potential difference V . An oxygen ion, with charge $2e$, starts from rest on the surface of one plate and accelerates to the other. If e denotes the magnitude of the electron charge, the final kinetic energy of this ion is:

- ▶ $eV/2$
- ▶ eV/d
- ▶ $eV d$
- ▶ **$2eV$**

An electron volt is :

- ▶ the force acting on an electron in a field of 1N/C
- ▶ the force required to move an electron 1 meter
- ▶ **the energy gained by an electron in moving through a potential**

difference of 1 volt

- ▶ the energy needed to move an electron through 1 meter in any electric field

An electron has charge $-e$ and mass m_e . A proton has charge e and mass $1840m_e$. A “proton volt” is equal to:

- ▶ **1 eV**
- ▶ 1840 eV
- ▶ $(1/1840)\text{ eV}$
- ▶ $\sqrt{1840}\text{ eV}$

Two conducting spheres are far apart. The smaller sphere carries a total charge Q . The larger sphere has a radius that is twice that of the smaller and is neutral. After the two spheres are connected by a conducting wire, the charges on the smaller and larger spheres, respectively, are:

- ▶ $Q/2$ and $Q/2$
- ▶ **$Q/3$ and $2Q/3$**
- ▶ $2Q/3$ and $Q/3$
- ▶ zero and Q

A conducting sphere with radius R is charged until the magnitude of the electric field just outside its surface is E . The electric potential of the sphere, relative to the potential far away, is:

- ▶ zero
- ▶ E/R
- ▶ E/R^2
- ▶ **ER**

A 5-cm radius conducting sphere has a surface charge density of $2 \times 10^{-6} \text{ C/m}^2$ on its surface. Its electric potential, relative to the potential far away, is:

- ▶ **$1.1 \times 10^4 \text{ V}$**
- ▶ $2.2 \times 10^4 \text{ V}$
- ▶ $2.3 \times 10^5 \text{ V}$
- ▶ $3.6 \times 10^5 \text{ V}$

A hollow metal sphere is charged to a potential V . The potential at its center is:

- ▶ **V**
- ▶ 0
- ▶ $-V$
- ▶ $2V$

Positive charge is distributed uniformly throughout a non-conducting sphere.

The highest electric potential occurs:

- ▶ **at the center**
- ▶ at the surface
- ▶ halfway between the center and surface
- ▶ just outside the surface

A total charge of $7 \times 10^{-8} \text{ C}$ 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:

- ▶ $-1.3 \times 10^4 \text{ V}$
- ▶ **$1.3 \times 10^4 \text{ V}$**
- ▶ $7.0 \times 10^5 \text{ V}$
- ▶ $-6.3 \times 10^4 \text{ V}$

Eight identical spherical raindrops are each at a potential V , relative to the potential far away. They coalesce to make one spherical raindrop whose potential is:

- ▶ $V/8$
- ▶ $V/2$

► 2V

► 4V

A metal sphere carries a charge of 5×10^{-9} C and is at a potential of 400V, relative to the potential far away. The potential at the center of the sphere is:

► 400V

► -400V

► 2×10^{-6} V

► 0

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:

► $+2.2 \times 10^{-7}$ C/m²

► -2.2×10^{-7} C/m²

► $+3.5 \times 10^{-7}$ C/m²

► $+1.8 \times 10^{-8}$ C/m²

A conducting sphere has charge Q and its electric potential is V , relative to the potential far away. If the charge is doubled to 2Q, the potential is:

► V

► 2V

► 4V

► V/4

The potential difference between the ends of a 2-meter stick that is parallel to a uniform electric field is 400V. The magnitude of the electric field is:

- ▶ zero
- ▶ 100V/m
- ▶ 200V/m
- ▶ **800V/m**

In a certain region of space the electric potential increases uniformly from east to west and does not vary in any other direction. The electric field:

- ▶ points east and varies with position
- ▶ **points east and does not vary with position**
- ▶ points west and varies with position
- ▶ points west and does not vary with position

If the electric field is in the positive x direction and has a magnitude given by $E = Cx^2$, where C is a constant, then the electric potential is given by $V =$:

- ▶ $2Cx$
- ▶ $-2Cx$
- ▶ $Cx^3/3$
- ▶ **$-Cx^3/3$**

The work required to carry a particle with a charge of 6.0C from a 5.0-V equipotential surface to a 6.0-V equipotential surface and back again to the 5.0-V surface is:

- ▶ **0**
- ▶ $1.2 \times 10^{-5} \text{ J}$
- ▶ $3.0 \times 10^{-5} \text{ J}$

- ▶ $6.0 \times 10^{-5} \text{ J}$

The equipotential surfaces associated with a charged point particles are:

- ▶ radially outward from the particle
- ▶ vertical planes
- ▶ horizontal planes
- ▶ **concentric spheres centered at the particle**

The electric field in a region around the origin is given by $E = C(x\hat{i} + y\hat{j})$, where C is a constant. The equipotential surfaces in that region are:

- ▶ **concentric cylinders with axes along the z axis**
- ▶ concentric cylinders with axes along the x axis
- ▶ concentric spheres centered at the origin
- ▶ planes parallel to the xy plane

A particle with charge q is to be brought from far away to a point near an electric dipole. No work is done if the final position of the particle is on:

- ▶ the line through the charges of the dipole
- ▶ **a line that is perpendicular to the dipole moment**
- ▶ a line that makes an angle of 45° with the dipole moment
- ▶ a line that makes an angle of 30° with the dipole moment

Equipotential surfaces associated with an electric dipole are:

- ▶ spheres centered on the dipole
- ▶ cylinders with axes along the dipole moment
- ▶ planes perpendicular to the dipole moment

► none of the above

The units of capacitance are equivalent to:

- J/C
- V/C
- J²/C
- **C²/J**

A farad is the same as a:

- J/V
- V/J
- **C/V**
- V/C

A capacitor C “has a charge Q”. The actual charges on its plates are:

- Q, Q
- Q/2, Q/2
- **Q, -Q**
- Q/2, -Q/2

Each plate of a capacitor stores a charge of magnitude 1mC when a 100-V potential difference is applied. The capacitance is:

- 5 μ F
- **10 μ F**
- 50 μ F
- 100 μ F

To charge a 1-F capacitor with 2C requires a potential difference of:

- ▶ **2V**
- ▶ 0.2V
- ▶ 5V
- ▶ 0.5V

The capacitance of a parallel-plate capacitor with plate area A and plate separation d is given by:

- ▶ $0d/A$
- ▶ $0d/2A$
- ▶ **$0A/d$**
- ▶ $0A/2d$

The capacitance of a parallel-plate capacitor is:

- ▶ **proportional to the plate area**
- ▶ proportional to the charge stored
- ▶ independent of any material inserted between the plates
- ▶ proportional to the potential difference of the plates

The capacitance of a parallel-plate capacitor can be increased by:

- ▶ increasing the charge
- ▶ decreasing the charge
- ▶ increasing the plate separation
- ▶ **decreasing the plate separation**

If both the plate area and the plate separation of a parallel-plate capacitor are doubled, the capacitance is:

- ▶ doubled
- ▶ halved
- ▶ **unchanged**
- ▶ tripled

If the plate area of an isolated charged parallel-plate capacitor is doubled:

- ▶ the electric field is doubled
- ▶ **the potential difference is halved**
- ▶ the charge on each plate is halved
- ▶ the surface charge density on each plate is doubled

If the plate separation of an isolated charged parallel-plate capacitor is doubled:

- ▶ the electric field is doubled
- ▶ the potential difference is halved
- ▶ the charge on each plate is halved
- ▶ **none of the above**

Pulling the plates of an isolated charged capacitor apart:

- ▶ increases the capacitance
- ▶ **increases the potential difference**
- ▶ does not affect the potential difference
- ▶ decreases the potential difference

If the charge on a parallel-plate capacitor is doubled:

- ▶ the capacitance is halved
- ▶ the capacitance is doubled
- ▶ the electric field is halved
- ▶ **the electric field is doubled**

A parallel-plate capacitor has a plate area of 0.2m^2 and a plate separation of 0.1mm . To obtain an electric field of $2.0 \times 10^6 \text{ V/m}$ between the plates, the magnitude of the charge on each plate should be:

- ▶ $8.9 \times 10^{-7} \text{ C}$
- ▶ $1.8 \times 10^{-6} \text{ C}$
- ▶ $3.5 \times 10^{-6} \text{ C}$
- ▶ **$7.1 \times 10^{-6} \text{ C}$**

A parallel-plate capacitor has a plate area of 0.2m^2 and a plate separation of 0.1 mm . If the charge on each plate has a magnitude of $4 \times 10^{-6} \text{ C}$ the potential difference across the plates is approximately:

- ▶ 0
- ▶ $4 \times 10^{-2} \text{ V}$
- ▶ $1 \times 10^2 \text{ V}$
- ▶ **$2 \times 10^2 \text{ V}$**

The capacitance of a spherical capacitor with inner radius a and outer radius b is proportional to:

- ▶ a/b
- ▶ $b - a$

- ▶ $b^2 - a^2$
- ▶ $ab/(b - a)$

The capacitance of a single isolated spherical conductor with radius R is proportional to:

- ▶ R
- ▶ R^2
- ▶ $1/R$
- ▶ $1/R^2$

The capacitance of a cylindrical capacitor can be increased by:

- ▶ decreasing both the radius of the inner cylinder and the length
- ▶ increasing both the radius of the inner cylinder and the length
- ▶ increasing the radius of the outer cylindrical shell and decreasing the length
- ▶ only by decreasing the length

A battery is used to charge a series combination of two identical capacitors. If the potential difference across the battery terminals is V and total charge Q flows through the battery during the charging process, then the charge on the positive plate of each capacitor and the potential difference across each capacitor are:

- ▶ $Q/2$ and $V/2$, respectively
- ▶ Q and V , respectively
- ▶ $Q/2$ and V , respectively

- ▶ **Q and $V/2$, respectively**

A battery is used to charge a parallel combination of two identical capacitors. If the potential difference across the battery terminals is V and total charge Q flows through the battery during the charging process then the charge on the positive plate of each capacitor and the potential difference across each capacitor are:

- ▶ $Q/2$ and $V/2$, respectively
- ▶ Q and V , respectively
- ▶ **$Q/2$ and V , respectively**
- ▶ Q and $V/2$, respectively

A $2\text{-}\mu\text{F}$ and a $1\text{-}\mu\text{F}$ capacitor are connected in series and a potential difference is applied across the combination. The $2\text{-}\mu\text{F}$ capacitor has:

- ▶ twice the charge of the $1\text{-}\mu\text{F}$ capacitor
- ▶ half the charge of the $1\text{-}\mu\text{F}$ capacitor
- ▶ twice the potential difference of the $1\text{-}\mu\text{F}$ capacitor
- ▶ **half the potential difference of the $1\text{-}\mu\text{F}$ capacitor**

A $2\text{-}\mu\text{F}$ and a $1\text{-}\mu\text{F}$ capacitor are connected in parallel and a potential difference is applied across the combination. The $2\text{-}\mu\text{F}$ capacitor has:

- ▶ **twice the charge of the $1\text{-}\mu\text{F}$ capacitor**
- ▶ half the charge of the $1\text{-}\mu\text{F}$ capacitor
- ▶ twice the potential difference of the $1\text{-}\mu\text{F}$ capacitor
- ▶ half the potential difference of the $1\text{-}\mu\text{F}$ capacitor

Let Q denote charge, V denote potential difference, and U denote stored energy. Of these quantities, capacitors in series must have the same:

- ▶ **Q only**
- ▶ V only
- ▶ U only
- ▶ Q and U only

Let Q denote charge, V denote potential difference, and U denote stored energy. Of these quantities, capacitors in parallel must have the same:

- ▶ Q only
- ▶ **V only**
- ▶ U only
- ▶ Q and U only

Capacitors C_1 and C_2 are connected in parallel. The equivalent capacitance is given by:

- ▶ $C_1 C_2 / (C_1 + C_2)$
- ▶ $(C_1 + C_2) / C_1 C_2$
- ▶ C_1 / C_2
- ▶ **$C_1 + C_2$**

Capacitors C_1 and C_2 are connected in series. The equivalent capacitance is given by:

- ▶ **$C_1 C_2 / (C_1 + C_2)$**
- ▶ $(C_1 + C_2) / C_1 C_2$

- ▶ $1/(C_1 + C_2)$
- ▶ C_1/C_2

Capacitors C_1 and C_2 are connected in series and a potential difference is applied to the combination. If the capacitor that is equivalent to the combination has the same potential difference, then the charge on the equivalent capacitor is the same as:

- ▶ **the charge on C_1**
- ▶ the sum of the charges on C_1 and C_2
- ▶ the difference of the charges on C_1 and C_2
- ▶ the product of the charges on C_1 and C_2

Questions:

1. Which weighs more, a liter of ice or a liter of water?
2. 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?
3. How is the wavelength of light related to its frequency?
4. 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?
5. Does every magnet necessarily have a north and south pole? Explain
6. In a cool room, a metal or marble table top feels much colder to the touch than does a wood surface even though they are at the same temperature. Why?

7. If a water wave oscillates up and down three times each second and the distance between wave crests is 2 m, what is its frequency? What is its wavelength? What is its wave speed?
8. A transformer has $N_1 = 350$ turns and $N_2 = 2\,000$ turns. If the input voltage is coil?
9. Why do astronomers looking at distant galaxies talk about looking backward in time?
10. Some distant astronomical objects, called quasars, are receding from us at half the speed of light (or greater). What is the speed of the light we receive from these quasars?
11. Consider a lamp hanging from a chain. What is the tension in the chain?
12. A proton travels with a speed of 3.00×10^6 m/s at an angle of 37.0° with the direction of a magnetic field of 0.300 T in the + y direction. What are (a) the magnitude of the magnetic force on the proton and (b) its acceleration?
13. Light from the Sun takes approximately 8.3 min to reach the Earth. During this time interval the Earth has continued to rotate on its axis. How far is the actual direction of the Sun from its image in the sky?
14. Do all current-carrying conductors emit electromagnetic waves? Explain
15. Explain solar convection zone. What is its other name?
16. 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?

17. Can all gas molecules in the vessel have the same speed?
18. What are the properties of wave function?
19. 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.
20. 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 ?
21. 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.
22. Who discovered the nucleus? Write the experimental setup that he follows.
23. In an analogy between electric current and automobile traffic flow, what would correspond to charge? What would correspond to current?
24. (a) When can you expect a body to emit blackbody radiation?
- (b) Which law is obeyed by Sun and other stars, briefly explain it.

25. 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.
26. 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?
27. You want to explore the shape of a certain molecule by scattering electrons of momentum p from a gas of the molecules and studying the deflection of the electrons.
28. You will be able to see finer details in the molecules by (a) increasing p ; (b) decreasing p ; (c) not worrying what p is.
29. A vessel is filled with gas at some equilibrium pressure and temperature. Can all gas molecules in the vessel have the same speed?
30. What are the properties of wave function?
31. 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.
32. Who discovered the nucleus? Write the experimental setup that he follows.

PHY101-PHYSICS FINAL TERM MCQS

Prepared by: JUNAID MALIK

AL-JUNAID TECH INSTITUTE



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Ph# 0304-1659294
Email: junaidfazal08@gmail.com

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1. The units of the Planck constant h are those of:

- A. energy
- B. power
- C. momentum
- D. angular momentum
- E. frequency

2. Which of the following is true of all virtual images?

- A. They can be seen but not photographed
- B. They are ephemeral
- C. They are smaller than the objects
- D. They are larger than the objects
- E. None of the above

ans: E

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

- A. expands with rising temperature
- B. expands linearly with rising temperature
- C. will not freeze
- D. will not boil
- E. undergoes some change when heated or cooled

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4. A 60-watt light bulb carries a current of 0.5 A. The total charge passing through it in one hour is:

- A. 120 C
- B. 3600 C
- C. 3000 C
- D. 2400 C
- E. 1800 C**

5. If the charge on a parallel-plate capacitor is doubled:

- A. the capacitance is halved
- B. the capacitance is doubled
- C. the electric field is halved
- D. the electric field is doubled**

6. the wavelength of red light is 700 nm. Its frequency is:

- A. 4.30×10^4 Hertz
- B. 4.30×10^5 Hertz** NOT SURE
- C. 4.30×10^3 Hertz
- D. 4.30×10^2 Hertz

7. A capacitor C “has a charge Q”. The actual charges on its plates are:

- A. Q, Q
- B. $Q/2$, $Q/2$
- C. Q, $-Q$**

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D. $Q/2, -Q/2$

8. How fast should you move away from a 6.0×10^{14} Hz light source to observe waves with a frequency of 4.0×10^{14} Hz?

A. $0.20c$

B. $0.38c$

C. $0.45c$

D. $0.51c$

E. $0.76c$

9. The units of the electric field are:

A. $J/(C \cdot m)$

B. J/C

C. $J \cdot C$

D. J/m

10. If two light waves are coherent:

A. their amplitudes are the same

B. their frequencies are the same

C. their wavelengths are the same

D. their phase difference is constant

11. In a photoelectric effect experiment at a frequency above cut off, the stopping potential is proportional to:

A. the energy of the least energetic electron before it is ejected

B. the energy of the least energetic electron after it is ejected

C. the energy of the most energetic electron before it is ejected

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D. the energy of the most energetic electron after it is ejected

12. The total energy in an LC circuit is 5.0×10^{-6} J. If $L = 25$ mH the maximum current is:

A. 10 mA

B. 14 mA

C. 20 mA

D. 28 mA

13. The quantum number m_s is most closely associated with what property of the electron in an atom?

A. Magnitude of the orbital angular momentum

B. Energy

C. z component of the spin angular momentum

D. z component of the orbital angular momentum

14. If 500 J of work are required to carry a charged particle between two points with a potential difference of 20 V, the magnitude of the charge on the particle is:

A. 0.040 C

B. 12.5 C

C. 20 C

D. cannot be computed unless the path is given

15. The smallest particle of any chemical element that can exist by itself and yet retain the qualities that distinguish it as that element is

: A. an electron

B. a proton

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C. a neutron

D. an atom

E. a molecule

16. A particle with a charge of $5.5 \times 10^{-8} \text{ C}$ is 3.5 cm from a particle with a charge of $-2.3 \times 10^{-8} \text{ C}$. The potential energy of this two-particle system, relative to the potential energy at infinite separation, is:

A. $3.2 \times 10^{-4} \text{ J}$

B. $-3.2 \times 10^{-4} \text{ J}$

C. $9.3 \times 10^{-3} \text{ J}$

D. $-9.3 \times 10^{-3} \text{ J}$

E. zero

17. A farad is the same as a:

A. J/V

B. V/J

C. C/V

D. V/C

E. N/C

18. 1 weber is the same as:

A. 1 V/s

B. 1 T/s

C. 1 T/m

D. $1 \text{ T} \cdot \text{m}^2$

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19. coherent sources of light mean

- A. They must have same speeds
 - B. They must have same frequency
 - C. They must have same amplitude
 - D. They must have fixed phase relative to each other
- not sure

20. Room temperature is about 20 degrees on the:

- A. Kelvin scale
- B. Celsius scale
- C. Fahrenheit scale
- D. absolute scale
- E. C major scale

21. The appearance of color in the thin film is due to:

- Interference

22. When you stand in front of a plane mirror, your image is:

- A. real, erect, and smaller than you
- B. real, erect, and the same size as you
- C. virtual, erect, and smaller than you

D. virtual, erect, and the same size as you

23. In a photoelectric effect experiment at a frequency above cut off, the number of electrons ejected is proportional to:

- A. their kinetic energy

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B. their potential energy

C. the work function

D. the frequency of the incident light

E. the number of photons that hit the sample

24. In a photoelectric effect experiment at a frequency above cut off, the stopping potential is proportional to:

A. the energy of the least energetic electron before it is ejected

B. the energy of the least energetic electron after it is ejected

C. the energy of the most energetic electron before it is ejected

D. the energy of the most energetic electron after it is ejected

E. the electron potential energy at the surface of the sample

25. The units of magnetic dipole moment are:

A. ampere

B. ampere·meter

C. ampere·meter²

D. ampere/meter

26. The primary of a 3 : 1 step-up transformer is connected to a source and the secondary is connected to a resistor R. The power dissipated by R in this situation is P. If R is connected directly to the source it will dissipate a power of:

A. $P/9$

B. $P/3$

C. P

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D. 3P

E. 9P

27. We desire to make an LC circuit that oscillates at 100 Hz using an inductance of 2.5 H. We also need a capacitance of:

A. 1 F

B. 1 mF

C. 1 μF

D. 100 μF

28. An ideal gas expands into a vacuum in a rigid vessel. As a result there is:

A. a change in entropy

B. an increase of pressure

C. a change in temperature

D. a decrease of internal energy

30. A step-down transformer is used to:

A. increase the power

B. decrease the power

C. increase the voltage

D. decrease the voltage

31. Which of the following electromagnetic radiations has photons with the greatest energy?

A. blue light

B. yellow light

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C. x rays

D. radio waves

33. The Stern-Gerlach experiment makes use of:

A. a strong uniform magnetic field

B. a strong non-uniform magnetic field

C. a strong uniform electric field

D. a strong non-uniform electric field

34. Let Q denote charge, V denote potential difference, and U denote stored energy. Of these quantities, capacitors in series must have the same:

A. Q only

B. V only

C. U only

D. Q and U only

35. Let Q denote charge, V denote potential difference, and U denote stored energy. Of these quantities, capacitors in parallel must have the same:

A. Q only

B. V only

C. U only

D. Q and U only

36. . “The sum of the currents into a junction equals the sum of the currents out of the junction” is a consequence of:

A. Newton’s third law

B. Ohm’s law

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C. Newton's second law

D. conservation of energy

E. conservation of charge

ans: E

37. "The sum of the emf's and potential differences around a closed loop equals zero" is a consequence of:

A. Newton's third law

B. Ohm's law

C. Newton's second law

D. conservation of energy

E. conservation of charge

38. Evidence for the wave nature of matter is:

A. electron diffraction experiments of Davisson and Germer

B. Thompson's measurement of e/m

C. Young's double slit experiment

D. the Compton effect

39. A conducting sphere with radius R is charged until the magnitude of the electric field just outside its surface is E . The electric potential of the sphere, relative to the potential far away, is:

A. zero

B. E/R

C. E/R^2

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D. ER

40. radio waves and light waves are ;

- Electromagnetic and transverse

41. An ideal gas expands into a vacuum in a rigid vessel. As a result there is:

A. a change in entropy

B. an increase of pressure

C. a change in temperature

D. a decrease of internal energy

42. Capacitors A and B are identical. Capacitor A is charged so it stores 4 J of energy and capacitor B is uncharged. The capacitors are then connected in parallel. The total stored energy in the capacitors is now:

A. 16 J

B. 8 J

C. 4 J

D. 2 J

43. Capacitors C1 and C2 are connected in parallel. The equivalent capacitance is given by:

A. $C_1 C_2 / (C_1 + C_2)$

B. $(C_1 + C_2) / C_1 C_2$

C. $1 / (C_1 + C_2)$

D. C_1 / C_2

E. $C_1 + C_2$

ans: E

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44. Capacitors C_1 and C_2 are connected in series. The equivalent capacitance is given by:

A. $C_1 C_2 / (C_1 + C_2)$

B. $(C_1 + C_2) / C_1 C_2$

C. $1 / (C_1 + C_2)$

D. C_1 / C_2

E. $C_1 + C_2$

45. During an adiabatic process an object does 100 J of work and its temperature decreases by 5 K. During another process it does 25 J of work and its temperature decreases by 5 K. Its heat capacity for the second process is:

A. 20 J/K

B. 24 J/K

C. 5 J/K

D. 15 J/K

46. A virtual image is one:

A. toward which light rays converge but do not pass through

B. from which light rays diverge but do not pass through

C. from which light rays diverge as they pass through

D. toward which light rays converge and pass through

47. A generator supplies 100 V to the primary coil of a transformer. The primary has 50 turns and the secondary has 500 turns. The secondary voltage is:

A. 1000 V

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B. 500 V

C. 250 V

D. 100 V

48. The rate at which electrical energy is used may be measured in:

A. watt/second

B. watt·second

C. watt

D. joule·second

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

Answer: They can, as this possibility is not contradicted by any of our descriptions of the motion of gases. If the vessel contains more than a few molecules, it is highly improbable that all will have the same speed. Collisions will make their speeds scatter according to the Boltzmann distribution law."

QUESTION: Electric potential energy:

Answer:

The electric potential is the energy of a unit charge in an electric field. So in our MKS units the unit of potential is 1Joule/Coulombs=1 Volt. Another useful unit is 1Electron Volt.

QUESTION: All objects radiate energy then why are we not able to see all the objects in the dark? Our eyes are not sensitive to infrared radiation so we do not see it. Cold bodies radiate mostly in the infrared zone (invisible to the human eye), but as the temperature increases the body will emit higher frequencies with more intensity. So room temperature objects will not be seen due to black body radiation.

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QUESTION: In a cool room, metal and marble is cool but wood is not cool when we touch. Why?

Answer: Because metal and stone conduct heat better than wood. Skin temperature is higher than room temperature, so when we touch metal, we give heat more quickly to the metal than wood. Another reason is that metal and stone store more energy than a like sized object of wood

QUESTION: what causes electric shock or voltage?

ANS: one clock is upstairs of the bedroom and second clock is in downstairs of the kitchen. Then which clock runs slowly?

Really, neither will run appreciably slower than the other. In the strictest sense, the clock in the upstairs bedroom is moving a few centimeters per year faster than the clock downstairs in the kitchen, because it is a few feet further from the Earth's center than the clock in the upstairs.

QUESTION: Difference between reflection and refraction?

ANS:

Reflection involves a change in direction of waves when they bounce off a barrier. Refraction of waves involves a change in the direction of waves as they pass from one medium to another. Refraction, or the bending of the path of the waves, is accompanied by a change in speed and wavelength of the waves.

Question:

If an electron and proton have same De Broglie's wavelength, which particle has greater speed

The de Broglie wavelength of a particle is inversely proportional to its momentum $p = m v$; since a proton is about 1800 times more massive than an electron, its momentum at the same speed is 1800 times that of an electron, and therefore its wavelength 1800 times smaller. The electron has the longer wavelength.

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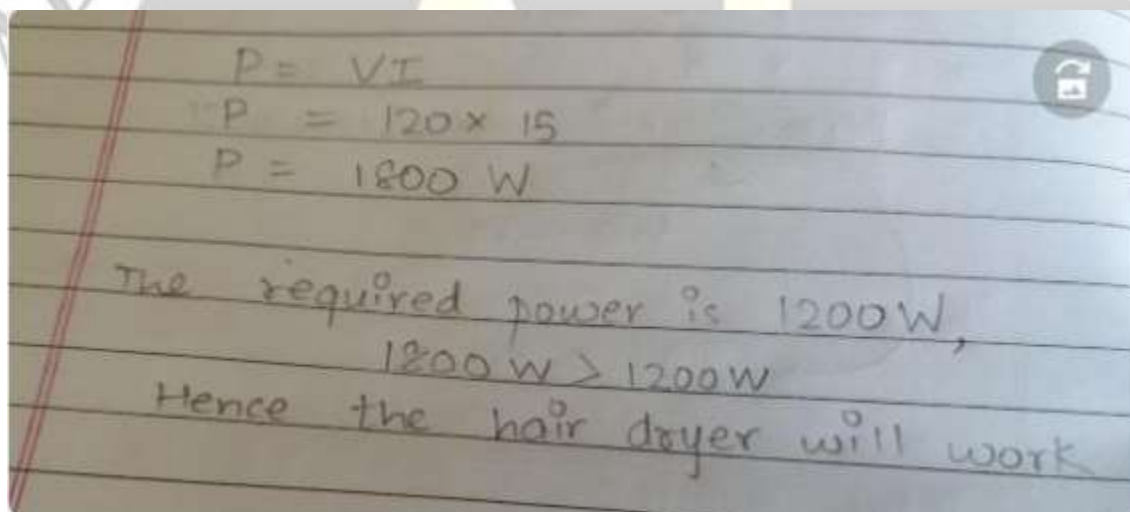
QUESTION: black and black body radiation?

ANS:

An object that absorbs all radiation falling on it, at all wavelengths, is called a black body. When a black body is at a uniform temperature, its emission has a characteristic frequency distribution that depends on the temperature. Its emission is called black-body radiation.

For examples include the heating element of a toaster and the filament of a light bulb.

QUESTION: If a 120 line to shocked is limited 15a by a safety fuse will it operate a 1200w hair dryer?



Handwritten calculation on lined paper:

$$P = VI$$
$$P = 120 \times 15$$
$$P = 1800 \text{ W}$$

The required power is 1200W,
 $1800 \text{ W} > 1200 \text{ W}$
Hence the hair dryer will work

QUESTION: Define statically mechanics

Ans: - The study of heat, considered as arising from the random motion of the basic constituents of matter, is an area of physics called statistical mechanics.

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QUESTION: is it true to say that Centre of mass and Centre of gravity are the same? Either yes or no explain in each case.

Answer: Many people assume that the terms “Centre of mass” and “Centre of gravity” are synonymous, but this is not the case. The center of mass and the Centre of gravity of an object are in the same position if the gravitational field in which the object exists is uniform.

QUESTION: What is the work done? If Force is 500N, height of downwards cliff is 30m Email and angle with land is 30 degrees.?

QUESTION: Magnetic Flux and Magnetic Flux density and when Flux is maximum and when it is zero?

ANS:

Because the induced EMF is proportional to the time rate of change of the magnetic flux, not to the magnetic flux itself, as shown in Faraday's law. In a sinusoidal wave, the maximum rate of change occurs at the zero crossing; in that point, the slope of the line tangent to the wave is the greatest, so the rate of change is the greatest (recall the derivative of a invariable function gives the slope of such function at each point). At the maximum or minimum value, the slope of the tangential line is zero, since it's a horizontal line, so the rate of change is zero.

The magnetic flux as a function of time is

$$\Phi(t) = B \cdot A(t) = BA \cos(\omega t)$$

$$\Phi(t) = B \cdot A(t) = BA \cos(\omega t) \quad \Phi(t) = B \cdot A(t) = BA \cos(\omega t)$$

B = the magnetic field and

$A(t)$ = the area vector as a function of time

ωt = the angle between the field and the area vector as a function of time.

$$\cos(90) = 0$$

But

Then the rate of change of the flux as a function of time is

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$$\Phi'(t) = -BA\omega \sin(\omega t)$$

$$\Phi'(t) = -BA\omega \sin(\omega t) \quad \Phi'(t) = -BA\omega \sin(\omega t)$$

the angle between (the area vector and the magnetic field) = zero.

flux = nonzero and equal to AB , its maximum, but the rate of change of the flux vanishes because

$$\sin(0) = 0, \sin(90) = 1.$$

QUESTION: How Isotopes change Atomic Mass, Magnetic spin moment and Chemical behavior of Elements

ANS:

Isotopes are atoms that have the same number of protons and electrons, but a different number of neutrons. Changing the number of neutrons in an atom does not change the element. Atoms of elements with different numbers of neutrons are called "isotopes" of that element. Isotopes behave similarly to other isotopes of the same element in chemical reactions because such reactions don't depend on the properties of atomic nuclei. Rather they depend on the number and arrangement of an atom's electrons.

QUESTION: Similarity and difference of gland meter and electric motor

ANS:

The motor requires Electricity, but the generator produces electricity. The shaft of the motor is driven by the magnetic force developed between the armature and the field winding, while in the case of the generator the shaft is connected to the rotor and driven by mechanical force

QUESTION: Fundamental source of Electromagnetic radiation

ANS:

A moving charge particle is the fundamental source of electromagnetic radiation.

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QUESTION: A photon of green light has a wavelength of 530nm. Find the photon's frequency, magnitude of momentum and electron volts. Express the energy in joules and electron volts.

ANS:

TAKE IDEA FROM THIS LINK

<https://socratic.org/questions/calculate-the-energy-in-joules-of-a-photon-of-green-light-having-a-wavelength-of>

<https://www.numerade.com/questions/a-photon-of-green-light-has-a-wavelength-of-520-nm-find-the-photon's-frequency-magnitude-of-momentum-/>

QUESTION: Find the difference between two waves which interfere constructively and destructively.

ANS:

There are two types of interference, constructive and destructive. In constructive interference, the amplitudes of the two waves add together resulting in a higher wave at the point they meet. In destructive interference, the two waves cancel out resulting in a lower amplitude at the point they meet.

QUESTION: Similarity and difference of galvanometer and electric motor

ANS:

Galvanometers and electric motors are both based on the same basic principle of **an external magnetic field exerting** a force on a current carrying wire. The difference is in how far the device is allowed to move. Motors must be able to move freely and rotate through complete 360° turns.

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QUESTION:

A 2000kg car is moving with a velocity of 20 m/s collides and locks with a 1500 kg car at rest a stop sign. Show the momentum is conserved.

A 2000-kg car moving with a speed of 20 m/s collides with and sticks to a 1500-kg car at rest at a stop sign. Show that because momentum is conserved in the rest frame, momentum is also conserved in a reference frame moving with a speed of 10 m/s in the direction of the moving car

QUESTION:

If you hold water in a paper cup over flame, can you bring the water to boil, if then how?

Just fill a **paper cup** with **water** and start trying to burn it from the outside. The **water** will boil vigorously inside the **cup**, but the **paper** itself will not combust. ... The **boiling water** can't get above 212 degrees, and the **paper** is thin enough that this **water** keeps its temperature from climbing high enough to combust.

Question: What is Corona?

Ans:

A corona discharge is **an electrical discharge caused by the ionization of a fluid** such as air surrounding a conductor carrying a high voltage. A corona occurs at locations where the strength of the electric field (potential gradient) around a conductor exceeds the dielectric strength of the air.

Question: Greenhouse effect explain.

Ans:

The greenhouse effect is a natural process that warms the Earth's surface. When the Sun's energy reaches the Earth's atmosphere, some of it is

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reflected back to space and the rest is absorbed and re-radiated by greenhouse gases. The absorbed energy warms the atmosphere and the surface of the Earth



PHY101 FINAL TERM SOLVED PAPER

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Question No: 1 (Marks: 1) - Please choose one

The number of significant figures in 0.00150 is:

- ▶ 5
- ▶ 4
- ▶ 3
- ▶ 2

Question No: 2 (Marks: 1) - Please choose one

One revolution is the same as:

2 π rad

- ▶ 1 rad
- ▶ 57 rad
- ▶ $\pi/2$ rad
- ▶ π rad
- ▶ 2 π rad

Question No: 3 (Marks: 1) - Please choose one

For a body to be in equilibrium under the combined action of several forces:

- ▶ all the forces must be applied at the same point
- all the forces must be applied at the same point
- ▶ all of the forces form pairs of equal and opposite forces
 - ▶ any two of these forces must be balanced by a third force
 - ▶ the sum of the torques about any point must equal zero

Question No: 4 (Marks: 1) - Please choose one

A bucket of water is pushed from left to right with increasing speed across a horizontal surface. Consider the pressure at two points at the same level in the water.

- ▶ It is the same

- ▶ It is higher at the point on the left
- ▶ It is higher at the point on the right
- ▶ At first it is higher at the point on the left but as the bucket speeds up it is lower there

Question No: 5 (Marks: 1) - Please choose one

An organ pipe with both ends open is 0.85m long. Assuming that the speed of sound is 340m/s, the frequency of the third harmonic of this pipe is:

- ▶ A. 200 Hz
- ▶ B. 300 Hz
- ▶ C. 400 Hz
- ▶ D. 600 Hz

Question No: 6 (Marks: 1) - Please choose one

Capacitors C1 and C2 are connected in series. The equivalent capacitance is given by

- ▶ $C_1 C_2 / (C_1 + C_2)$
- ▶ $(C_1 + C_2) / C_1 C_2$
- ▶ $1 / (C_1 + C_2)$
- ▶ C_1 / C_2

Question No: 7 (Marks: 1) - Please choose one

If the potential difference across a resistor is doubled:

- ▶ only the current is doubled
- ▶ only the current is halved
- ▶ only the resistance is doubled
- ▶ only the resistance is halved

Question No: 8 (Marks: 1) - Please choose one

By using only two resistors, R1 and R2, a student is able to obtain resistances of 3 Ω , 4 Ω , 12 Ω , and 16 Ω . The values of R1 and R2 (in ohms) are:

- ▶ 3, 4
- ▶ 2, 12
- ▶ 3, 16
- ▶ 4, 12

Question No: 9 (Marks: 1) - Please choose one

Faraday's law states that an induced emf is proportional to:

- ▶ the rate of change of the electric field
- ▶ the rate of change of the magnetic flux
- ▶ the rate of change of the electric flux

- ▶ the rate of change of the magnetic field

Question No: 10 (Marks: 1) - Please choose one

A generator supplies 100V to the primary coil of a transformer. The primary has 50 turns and the secondary has 500 turns. The secondary voltage is:

- ▶ 1000V
- ▶ 500V
- ▶ 250V
- ▶ 100V

Question No: 11 (Marks: 1) - Please choose one

The wavelength of red light is 700 nm. Its frequency is_____.

- ▶ 4.30×10^4 Hertz
- ▶ 4.30×10^3 Hertz
- ▶ 4.30×10^5 Hertz
- ▶ 4.30×10^2 Hertz

Question No: 12 (Marks: 1) - Please choose one

In some movies, you sometimes see an actor looking in a mirror and you can see his face in the mirror. During the filming of this scene, what does the actor see in the mirror?

- ▶ His face
- ▶ Your face
- ▶ The movie camera
- ▶ The director's face

Question No: 13 (Marks: 1) - Please choose one

A laser in a compact disc player generates light that has a wavelength of 780 nm in air. The light then enters into the plastic of a CD. If the index of refraction of plastic is 1.55, the speed of this light once enter the plastic is_____.

- ▶ 3.00×10^8 m/s
- ▶ 1.94×10^8 m/s
- ▶ 4.29×10^8 km/h
- ▶ 3.00×10^8 km/h

Question No: 14 (Marks: 1) - Please choose one

Which of the following electromagnetic radiations has photons with the greatest energy?

- ▶ blue light
- ▶ yellow light
- ▶ x rays
- ▶ radio waves

Question No: 15 (Marks: 1) - Please choose one

A virtual image is one:

- ▶ toward which light rays converge but do not pass through
- ▶ from which light rays diverge as they pass through
- ▶ toward which light rays converge and pass through
- ▶ from which light rays diverge but do not pass through

Question No: 16 (Marks: 1) - Please choose one

What is the unit of magnification factor?

- ▶ meter.Kelvin
- ▶ radian.Kelvin
- ▶ degree.Kelvin
- ▶ no units

Question No: 17 (Marks: 1) - Please choose one

During an adiabatic process an object does 100 J of work and its temperature decreases by 5K. During another process it does 25 J of work and its temperature decreases by 5 K. Its heat capacity for the second process is.

- ▶ 20 J/K

- ▶ 100 J/K
- ▶ 15 J/K
- ▶ 5 J/K

Question No: 18 (Marks: 1) - Please choose one

An ideal gas expands into a vacuum in a rigid vessel. As a result there is:

- ▶ a change in entropy
- ▶ a decrease of internal energy
- ▶ an increase of pressure
- ▶ a change in temperature

Question No: 19 (Marks: 1) - Please choose one

The Stern-Gerlach experiment makes use of:

- ▶ a strong uniform magnetic field
- ▶ a strong non-uniform magnetic field
- ▶ a strong uniform electric field
- ▶ a strong non-uniform electric field

Question No: 20 (Marks: 1) - Please choose one

A large collection of nuclei are undergoing alpha decay. The rate of decay at any instant is proportional to:

- ▶ the number of undecayed nuclei present at that instant
- ▶ the time since the decays started
- ▶ the time remaining before all have decayed
- ▶ the half-life of the decay

Question No: 21 (Marks: 1)

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

Question No: 22 (Marks: 1)

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?

Question No: 23 (Marks: 1)

How is the wavelength of light related to its frequency?

Question No: 24 (Marks: 1)

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?

Question No: 25 (Marks: 2)

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

Question No: 26 (Marks: 2)

In a cool room, a metal or marble table top feels much colder to the touch than does a wood surface even though they are at the same temperature. Why?

Question No: 27 (Marks: 3)

If a water wave oscillates up and down three times each second and the distance between wave crests is 2 m, what is its frequency? What is its wavelength? What is its wave speed?

Question No: 28 (Marks: 3)

A transformer has $N_1 = 350$ turns and $N_2 = 2\,000$ turns. If the input voltage is $v(t) = (170\text{ V}) \cos \omega t$, what rms voltage is developed across the secondary coil?

Question No: 29 (Marks: 3)

Why do astronomers looking at distant galaxies talk about looking backward in time?

Question No: 30 (Marks: 3)

Some distant astronomical objects, called quasars, are receding from us at half the speed of light (or greater). What is the speed of the light we receive from these quasars?

Question No: 31 (Marks: 5)

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



Question No: 32 (Marks: 5)

A proton travels with a speed of 3.00×10^6 m/s at an angle of 37.0° with the direction of a magnetic field of 0.300 T in the + y direction. What are (a) the magnitude of the magnetic force on the proton and (b) its acceleration?

Question No: 33 (Marks: 5)

1. Light from the Sun takes approximately 8.3 min to reach the Earth. During this time interval the Earth has continued to rotate on its axis. How far is the actual direction of the Sun from its image in the sky?

2. Do all current-carrying conductors emit electromagnetic waves? Explain

2. Yes all current carrying conductors emit electromagnetic waves, and these are at the right angle of the current passes thorough as right hand rule of Fleming's explains it.

Question No: 34 (Marks: 5)

Explain solar convection zone. What is its other name?

Question No: 35 (Marks: 10)

a) Explain why you can't just open your refrigerator to cool your kitchen on a hot day. Why is it that turning on a room air conditioner will cool down the room but opening a refrigerator door will not?

b) On a humid day, water vapor condenses on a cold surface. During condensation, the entropy of the water (a) in-creases, (b) remains constant, (c) decreases, (d) may decreases or remain unchanged. Give its reason.

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PHY101 Physics Final Term Solved MCQs Mega File (All in One)

1. A total charge of 6.3×10^{-8} C is distributed uniformly throughout a 2.7-cm radius sphere. The volume charge density is:

- A. 3.7×10^{-7} C/m³
- B. 6.9×10^{-6} C/m³
- C. 6.9×10^{-6} C/m²
- D. 2.5×10^{-4} C/m³
- E. 7.6×10^{-4} C/m³**

ans: E

2. Charge is placed on the surface of a 2.7-cm radius isolated conducting sphere. The surface charge density is uniform and has the value 6.9×10^{-6} C/m². The total charge on the sphere is:

- A. 5.6×10^{-10} C
- B. 2.1×10^{-8} C
- C. 4.7×10^{-8} C
- D. 6.3×10^{-8} C**
- E. 9.5×10^{-3} C

ans: D

3. A spherical shell has an inner radius of 3.7 cm and an outer radius of 4.5 cm. If charge is distributed uniformly throughout the shell with a volume density of 6.1×10^{-4} C/m³ the total charge is:

- A. 1.0×10^{-7} C**
- B. 1.3×10^{-7} C
- C. 2.0×10^{-7} C
- D. 2.3×10^{-7} C
- E. 4.0×10^{-7} C

ans: A

4. A cylinder has a radius of 2.1 cm and a length of 8.8 cm. Total Charge 1×10^{-7} C is distributed uniformly throughout. The volume charge density is:

- A. 5.3×10^{-5} C/m³
- B. 5.3×10^{-5} C/m²
- C. 8.5×10^{-4} C/m³
- D. 5.0×10^{-3} C/m³**
- E. 6.3×10^{-2} C/m³

ans: D

5. When a piece of paper is held with one face perpendicular to a uniform electric field the flux through it is $25 \text{ N} \cdot \text{m}^2/\text{C}$. When the paper is turned 25° with respect to the field the flux through it is:

- A. 0
- B. $12 \text{ N} \cdot \text{m}^2/\text{C}$
- C. $21 \text{ N} \cdot \text{m}^2/\text{C}$
- D. $23 \text{ N} \cdot \text{m}^2/\text{C}$**
- E. $25 \text{ N} \cdot \text{m}^2/\text{C}$

ans: D

6. The flux of the electric field $(24 \text{ N/C})\hat{i} + (30 \text{ N/C})\hat{j} + (16 \text{ N/C})\hat{k}$ through a 2.0 m^2 portion of the yz plane is:

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- A. $32\text{N} \cdot \text{m}^2/\text{C}$
 - B. $34\text{N} \cdot \text{m}^2/\text{C}$
 - C. $42\text{N} \cdot \text{m}^2/\text{C}$
 - D. $48\text{N} \cdot \text{m}^2/\text{C}$**
 - E. $60\text{N} \cdot \text{m}^2/\text{C}$
- ans: D

7. Consider Gauss's law: $\oint \mathbf{E} \cdot d\mathbf{A} = q/\epsilon_0$. Which of the following is true?

- A. $\oint \mathbf{E}$ must be the electric field due to the enclosed charge
 - B. If $q = 0$, then $\oint \mathbf{E} = 0$ everywhere on the Gaussian surface
 - C. If the three particles inside have charges of $+q$, $+q$, and $-2q$, then the integral is zero**
 - D. on the surface $\oint \mathbf{E}$ is everywhere parallel to $d\mathbf{A}$
 - E. If a charge is placed outside the surface, then it cannot affect $\oint \mathbf{E}$ at any point on the surface
- ans: C

8. A charged point particle is placed at the center of a spherical Gaussian surface. The electric flux Φ_E is changed if:

- A. the sphere is replaced by a cube of the same volume
 - B. the sphere is replaced by a cube of one-tenth the volume
 - C. the point charge is moved off center (but still inside the original sphere)
 - D. the point charge is moved to just outside the sphere**
 - E. a second point charge is placed just outside the sphere
- ans: D

9. Choose the INCORRECT statement:

- A. Gauss' law can be derived from Coulomb's law
 - B. Gauss' law states that the net number of lines crossing any closed surface in an outward direction is proportional to the net charge enclosed within the surface
 - C. Coulomb's law can be derived from Gauss' law and symmetry
 - D. Gauss' law applies to a closed surface of any shape
 - E. According to Gauss' law, if a closed surface encloses no charge, then the electric field must vanish everywhere on the surface**
- ans: E

10. The outer surface of the cardboard center of a paper towel roll:

- A. is a possible Gaussian surface
 - B. cannot be a Gaussian surface because it encloses no charge
 - C. cannot be a Gaussian surface since it is an insulator
 - D. cannot be a Gaussian surface because it is not a closed surface**
 - E. none of the above
- ans: D

11. A physics instructor in an anteroom charges an electrostatic generator to $25\text{ }\mu\text{C}$, then carries it into the lecture hall. The net electric flux in $\text{N} \cdot \text{m}^2/\text{C}$ through the lecture hall walls is:

- A. 0
 - B. 25×10^{-6}
 - C. 2.2×10^5
 - D. 2.8×10^6**
 - E. can not tell unless the lecture hall dimensions are given
- ans: D

12. A point particle with charge q is placed inside the cube but not at its center. The electric flux through any one side of the cube:

- A. is zero
 - B. is q/ϵ_0
 - C. is $q/4\epsilon_0$
 - D. is $q/6\epsilon_0$
 - E. cannot be computed using Gauss' law**
- ans: E

13. A particle with charge $5.0\text{-}\mu\text{C}$ is placed at the corner of a cube. The total electric flux in $\text{N} \cdot \text{m}^2/\text{C}$ through all sides of the cube is:

- A. 0
- B. 7.1×10^4
- C. 9.4×10^4



D. 1.4×10^5 E. 5.6×10^5

ans: E

14. A point particle with charge q is at the center of a Gaussian surface in the form of a cube. The electric flux through any one face of the cube is:

A. $q/6\epsilon_0$ B. $q/4\pi\epsilon_0$ C. $q/3\epsilon_0$ D. $q/6\epsilon_0$ E. $q/12\epsilon_0$

ans: D

15. The table below gives the electric flux in $\text{N}\cdot\text{m}^2/\text{C}$ through the ends and round surfaces of four Gaussian surfaces in the form of cylinders. Rank the cylinders according to the charge inside, from the most negative to the most positive. left end right end rounded surface

cylinder 1: $+2 \times 10^{-9}$ $+4 \times 10^{-9}$ -6×10^{-9} cylinder 2: $+3 \times 10^{-9}$ -2×10^{-9} $+6 \times 10^{-9}$ cylinder 3: -2×10^{-9} -5×10^{-9} $+3 \times 10^{-9}$ cylinder 4: $+2 \times 10^{-9}$ -5×10^{-9} -3×10^{-9}

A. 1, 2, 3, 4

B. 4, 3, 2, 1

C. 3, 4, 2, 1

D. 3, 1, 4, 2

E. 4, 3, 1, 2

ans: E

16. A conducting sphere of radius 0.01m has a charge of 1.0×10^{-9} C deposited on it. The magnitude of the electric field in N/C just outside the surface of the sphere is:

A. 0

B. 450

C. 900

D. 4500

E. 90,000

ans: C

17. A round wastepaper basket with a 0.15-m radius opening is in a uniform electric field of 300 N/C , perpendicular to the opening. The total flux through the sides and bottom, in $\text{N} \cdot \text{m}^2/\text{C}$, is:

A. 0

B. 4.2

C. 21

D. 280

E. can not tell without knowing the areas of the sides and bottom

ans: C

18. 10 C of charge are placed on a spherical conducting shell. A particle with a charge of -3 C is placed at the center of the cavity. The net charge on the inner surface of the shell is:

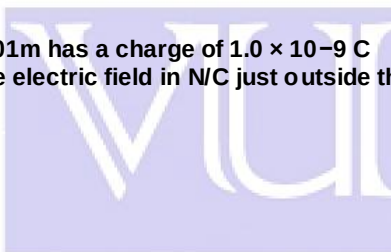
A. -7 C B. -3 C C. 0 C D. $+3 \text{ C}$ E. $+7 \text{ C}$

ans: D

19. 10 C of charge are placed on a spherical conducting shell. A particle with a charge of -3 C is placed at the center of the cavity. The net charge on the outer surface of the shell is:

A. -7 C B. -3 C C. 0 C D. $+3 \text{ C}$ E. $+7 \text{ C}$

ans: E



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20. A 30-N/C uniform electric field points perpendicularly toward the left face of a large neutral conducting sheet. The surface charge density in C/m² on the left and right faces, respectively, are:

- A. $-2.7 \times 10^{-9} \text{ C/m}^2$; $+2.7 \times 10^{-9} \text{ C/m}^2$
- B. $+2.7 \times 10^{-9} \text{ C/m}^2$; $-2.7 \times 10^{-9} \text{ C/m}^2$
- C. $-5.3 \times 10^{-9} \text{ C/m}^2$; $+5.3 \times 10^{-9} \text{ C/m}^2$
- D. $+5.3 \times 10^{-9} \text{ C/m}^2$; $-5.3 \times 10^{-9} \text{ C/m}^2$
- E. 0; 0

ans: A

23. Charge Q is distributed uniformly throughout an insulating sphere of radius R. The magnitude of the electric field at a point R/2 from the center is:

- A. $Q/4\pi\epsilon_0 R^2$
- B. $Q/\pi\epsilon_0 R^2$
- C. $3Q/4\pi\epsilon_0 R^2$
- D. $Q/8\pi\epsilon_0 R^2$
- E. none of these

ans: D

24. Positive charge Q is distributed uniformly throughout an insulating sphere of radius R, centered at the origin. A particle with positive charge q is placed at $x = 2R$ on the x axis. The magnitude of the electric field at $x = R/2$ on the x axis is:

- A. $Q/4\pi\epsilon_0 R^2$
- B. $Q/8\pi\epsilon_0 R^2$
- C. $Q/72\pi\epsilon_0 R^2$
- D. $17Q/72\pi\epsilon_0 R^2$
- E. none of these

ans: C

25. Charge Q is distributed uniformly throughout a spherical insulating shell. The net electric flux in $\text{N} \cdot \text{m}^2 / \text{C}$ through the inner surface of the shell is:

- A. 0
- B. Q/ϵ_0
- C. $2Q/\epsilon_0$
- D. $Q/4\pi\epsilon_0$
- E. $Q/2\pi\epsilon_0$

ans: A

26. Charge Q is distributed uniformly throughout a spherical insulating shell. The net electric flux in $\text{N} \cdot \text{m}^2 / \text{C}$ through the outer surface of the shell is:

- A. 0
- B. Q/ϵ_0
- C. $2Q/\epsilon_0$
- D. $Q/4\epsilon_0$
- E. $Q/2\pi\epsilon_0$

ans: B

27. A 3.5-cm radius hemisphere contains a total charge of $6.6 \times 10^{-7} \text{ C}$. The flux through the rounded portion of the surface is $9.8 \times 10^4 \text{ N} \cdot \text{m}^2 / \text{C}$. The flux through the flat base is:

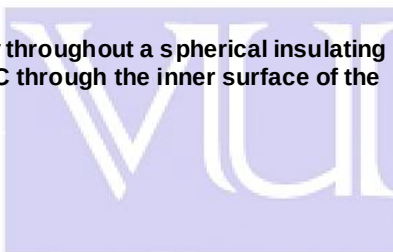
- A. 0
- B. $+2.3 \times 10^4 \text{ N} \cdot \text{m}^2 / \text{C}$
- C. $-2.3 \times 10^4 \text{ N} \cdot \text{m}^2 / \text{C}$
- D. $-9.8 \times 10^4 \text{ N} \cdot \text{m}^2 / \text{C}$
- E. $+9.8 \times 10^4 \text{ N} \cdot \text{m}^2 / \text{C}$

ans: C

28. Charge is distributed uniformly along a long straight wire. The electric field 2 cm from the wire is 20 N/C. The electric field 4 cm from the wire is:

- A. 120 N/C
- B. 80 N/C
- C. 40 N/C
- D. 10 N/C
- E. 5 N/C

ans: D



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29. Positive charge Q is placed on a conducting spherical shell with inner radius R_1 and outer radius R_2 . A point charge q is placed at the center of the cavity. The magnitude of the electric field at a point outside the shell, a distance r from the center, is:

- A. zero
- B. $Q/4\pi\epsilon_0 r^2$
- C. $q/4\pi\epsilon_0 r^2$
- D. $(q + Q)/4\pi\epsilon_0 r^2$**
- E. $(q + Q)/4\pi\epsilon_0 (R_2^2 - r^2)$

ans: D

30. Positive charge Q is placed on a conducting spherical shell with inner radius R_1 and outer radius R_2 . A point charge q is placed at the center of the cavity. The magnitude of the electric field produced by the charge on the inner surface at a point in the interior of the conductor, a distance r from the center, is:

- A. 0
- B. $Q/4\pi\epsilon_0 R_2^2$
- C. $Q/4\pi\epsilon_0 R_2^2$
- D. $q/4\pi\epsilon_0 r^2$**
- E. $Q/4\pi\epsilon_0 r^2$

ans: D

31. A long line of charge with λ charge per unit length runs along the cylindrical axis of a cylindrical shell which carries a charge per unit length of λ_c . The charge per unit length on the inner and outer surfaces of the shell, respectively are:

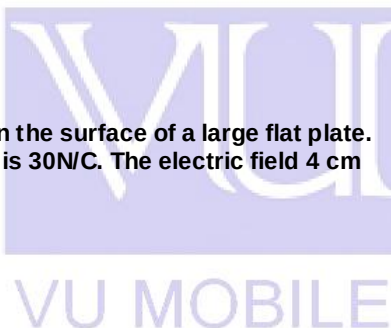
- A. λ and λ_c
- B. $-\lambda$ and $\lambda_c + \lambda$**
- C. $-\lambda$ and $\lambda_c - \lambda$
- D. $\lambda + \lambda_c$ and $\lambda_c - \lambda$
- E. $\lambda - \lambda_c$ and $\lambda_c + \lambda$

ans: B

32. Charge is distributed uniformly on the surface of a large flat plate. The electric field 2 cm from the plate is 30 N/C. The electric field 4 cm from the plate is:

- A. 120 N/C
- B. 80 N/C
- C. 30 N/C
- D. 15 N/C
- E. 7.5 N/C

ans: C



33. A particle with charge Q is placed outside a large neutral conducting sheet. At any point in the interior of the sheet the electric field produced by charges on the surface is directed:

- A. toward the surface
- B. away from the surface
- C. toward Q**
- D. away from Q
- E. none of the above

ans: C

34. A hollow conductor is positively charged. A small uncharged metal ball is lowered by a silk thread through a small opening in the top of the conductor and allowed to touch its inner surface. After the ball is removed, it will have:

- A. a positive charge
- B. a negative charge
- C. no appreciable charge**
- D. a charge whose sign depends on what part of the inner surface it touched
- E. a charge whose sign depends on where the small hole is located in the conductor

ans: C

35. A spherical conducting shell has charge Q . A particle with charge q is placed at the center of the cavity. The charge on the inner surface of the shell and the charge on the outer surface of the shell, respectively, are:

- A. 0, Q
- B. q , $Q - q$
- C. Q , 0

D. $-q, Q + q$

E. $-q, 0$

ans: D

36. A particle with a charge of $5.5 \times 10^{-8} \text{ C}$ is 3.5 cm from a particle with a charge of $-2.3 \times 10^{-8} \text{ C}$. The potential energy of this two-particle system, relative to the potential energy at infinite separation, is:

A. $3.2 \times 10^{-4} \text{ J}$

B. $-3.2 \times 10^{-4} \text{ J}$

C. $9.3 \times 10^{-3} \text{ J}$

D. $-9.3 \times 10^{-3} \text{ J}$

E. zero

ans: B

37. A particle with a charge of $5.5 \times 10^{-8} \text{ C}$ is fixed at the origin. A particle with a charge of $-2.3 \times 10^{-8} \text{ C}$ is moved from $x = 3.5 \text{ cm}$ on the x axis to $y = 4.3 \text{ cm}$ on the y axis. The change in potential energy of the two-particle system is:

A. $3.1 \times 10^{-3} \text{ J}$

B. $-3.1 \times 10^{-3} \text{ J}$

C. $6.0 \times 10^{-5} \text{ J}$

D. $-6.0 \times 10^{-5} \text{ J}$

E. 0

ans: C

38. A particle with a charge of $5.5 \times 10^{-8} \text{ C}$ charge is fixed at the origin. A particle with a charge of $-2.3 \times 10^{-8} \text{ C}$ charge is moved from $x = 3.5 \text{ cm}$ on the x axis to $y = 3.5 \text{ cm}$ on the y axis. The change in the potential energy of the two-particle system is:

A. $3.2 \times 10^{-4} \text{ J}$

B. $-3.2 \times 10^{-4} \text{ J}$

C. $9.3 \times 10^{-3} \text{ J}$

D. $-9.3 \times 10^{-3} \text{ J}$

E. 0

ans: E

39. Three particles lie on the x axis: particle 1, with a charge of $1 \times 10^{-8} \text{ C}$ is at $x = 1 \text{ cm}$, particle 2, with a charge of $2 \times 10^{-8} \text{ C}$, is at $x = 2 \text{ cm}$, and particle 3, with a charge of $-3 \times 10^{-8} \text{ C}$, is at $x = 3 \text{ cm}$. The potential energy of this arrangement, relative to the potential energy for infinite separation, is:

A. $+4.9 \times 10^{-4} \text{ J}$

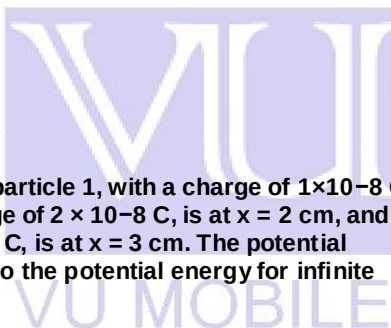
B. $-4.9 \times 10^{-4} \text{ J}$

C. $+8.5 \times 10^{-4} \text{ J}$

D. $-8.5 \times 10^{-4} \text{ J}$

E. zero

ans: B



40. Two identical particles, each with charge q , are placed on the x axis, one at the origin and the other at $x = 5 \text{ cm}$. A third particle, with charge $-q$, is placed on the x axis so the potential energy of the three-particle system is the same as the potential energy at infinite separation. Its x coordinate is:

A. 13 cm

B. 2.5 cm

C. 7.5 cm

D. 10 cm

E. -5 cm

ans: A

41. Choose the correct statement:

A. A proton tends to go from a region of low potential to a region of high potential

B. The potential of a negatively charged conductor must be negative

C. If $\square E = 0$ at a point P then V must be zero at P

D. If $V = 0$ at a point P then $\square E$ must be zero at P

E. None of the above are correct

ans: E

42. If 500 J of work are required to carry a charged particle between two points with a potential difference of 20V, the magnitude of the charge on the particle is:

A. 0.040C

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B. 12.5C

C. 20C

D. cannot be computed unless the path is given

E. none of these

ans: B

43. The potential difference between two points is 100V. If a particle with a charge of 2C is transported from one of these points to the other, the magnitude of the work done is:

A. 200 J

B. 100 J

C. 50 J

D. 100 J

E. 2 J

ans: A

44. During a lightning discharge, 30C of charge move through a potential difference of 1.0×10^8 V in 2.0×10^{-2} s. The energy released by this lightning bolt is:

A. 1.5×10^{11} JB. 3.0×10^9 JC. 6.0×10^7 JD. 3.3×10^6 J

E. 1500 J

ans: B

45. An electron is accelerated from rest through a potential difference V . Its final speed is proportional to:

A. V

B. V^2 C. $\sqrt{V}$ D. $1/V$ E. $1/\sqrt{V}$

ans: C

46. Two large parallel conducting plates are separated by a distance d, placed in a vacuum, and connected to a source of potential difference V . An oxygen ion, with charge 2e, starts from rest on the surface of one plate and accelerates to the other. If e denotes the magnitude of the electron charge, the final kinetic energy of this ion is:

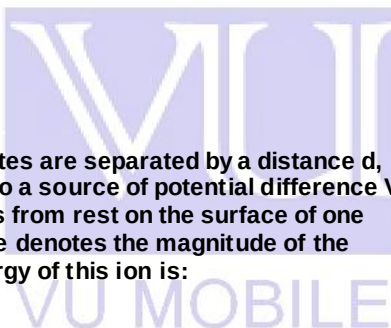
A. eV/2

B. eV/d

C. eVd

D. Vd/e **E. 2eV**

ans: E

**47. An electron volt is :**

A. the force acting on an electron in a field of 1N/C

B. the force required to move an electron 1 meter

C. the energy gained by an electron in moving through a potential difference of 1 volt

D. the energy needed to move an electron through 1 meter in any electric field

E. the work done when 1 coulomb of charge is moved through a potential difference of 1 volt.

ans: C

48. An electron has charge $-e$ and mass m_e . A proton has charge e and mass $1840m_e$. A “proton volt” is equal to:

A. 1 eV

B. 1840 eV

C. $(1/1840)$ eVD. $\sqrt{1840}$ eVE. $(1/\sqrt{1840})$ eV

ans: A

49. Two conducting spheres are far apart. The smaller sphere carries a total charge Q. The larger sphere has a radius that is twice that of the smaller and is neutral. After the two spheres are connected by a conducting wire, the charges on the smaller and larger spheres, respectively, are:

A. $Q/2$ and $Q/2$ **B. $Q/3$ and $2Q/3$**

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- C. $2Q/3$ and $Q/3$
 D. zero and Q
 E. $2Q$ and $-Q$
 ans: B

50. A conducting sphere with radius R is charged until the magnitude of the electric field just outside its surface is E . The electric potential of the sphere, relative to the potential far away, is:

- A. zero
 B. E/R
 C. E/R^2
D. ER
 E. ER^2
 ans: D

51. A 5-cm radius conducting sphere has a surface charge density of $2 \times 10^{-6} \text{ C/m}^2$ on its surface. Its electric potential, relative to the potential far away, is:

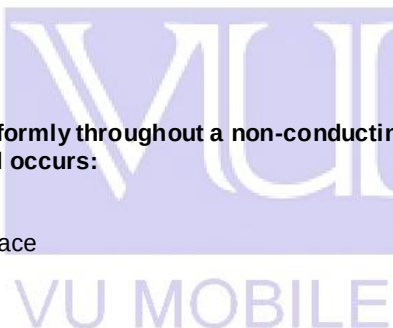
- A. $1.1 \times 10^4 \text{ V}$**
 B. $2.2 \times 10^4 \text{ V}$
 C. $2.3 \times 10^5 \text{ V}$
 D. $3.6 \times 10^5 \text{ V}$
 E. $7.2 \times 10^6 \text{ V}$
 ans: A

52. A hollow metal sphere is charged to a potential V . The potential at its center is:

- A. V**
 B. 0
 C. $-V$
 D. $2V$
 E. πV
 ans: A

53. Positive charge is distributed uniformly throughout a non-conducting sphere. The highest electric potential occurs:

- A. at the center**
 B. at the surface
 C. halfway between the center and surface
 D. just outside the surface
 E. far from the sphere
 ans: A



54. A total charge of $7 \times 10^{-8} \text{ C}$ 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:

- A. $-1.3 \times 10^4 \text{ V}$
B. $1.3 \times 10^4 \text{ V}$
 C. $7.0 \times 10^5 \text{ V}$
 D. $-6.3 \times 10^4 \text{ V}$
 E. 0
 ans: B

55. Eight identical spherical raindrops are each at a potential V , relative to the potential far away. They coalesce to make one spherical raindrop whose potential is:

- A. $V/8$
 B. $V/2$
 C. $2V$
D. $4V$
 E. $8V$
 ans: D

56. A metal sphere carries a charge of $5 \times 10^{-9} \text{ C}$ and is at a potential of 400V, relative to the potential far away. The potential at the center of the sphere is:

- A. 400V**
 B. $-400V$
 C. $2 \times 10^{-6} \text{ V}$
 D. 0
 E. none of these
 ans: A

57. 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. $+2.2 \times 10^{-7} \text{ C/m}^2$
- B. $-2.2 \times 10^{-7} \text{ C/m}^2$
- C. $+3.5 \times 10^{-7} \text{ C/m}^2$
- D. $-3.5 \times 10^{-7} \text{ C/m}^2$
- E. $+1.8 \times 10^{-8} \text{ C/m}^2$

ans: E

57. A conducting sphere has charge Q and its electric potential is V , relative to the potential far away. If the charge is doubled to 2Q, the potential is:

- A. V
- B. 2V
- C. 4V
- D. V/2
- E. V/4

ans: B

58. The potential difference between the ends of a 2-meter stick that is parallel to a uniform electric field is 400V. The magnitude of the electric field is:

- A. zero
- B. 100V/m
- C. 200V/m
- D. 400V/m
- E. 800V/m

ans: E

59. In a certain region of space the electric potential increases uniformly from east to west and does not vary in any other direction. The electric field:

- A. points east and varies with position
- B. points east and does not vary with position
- C. points west and varies with position
- D. points west and does not vary with position
- E. points north and does not vary with position

ans: B

60. If the electric field is in the positive x direction and has a magnitude given by $E = Cx^2$, where C is a constant, then the electric potential is given by V =:

- A. $2Cx$
- B. $-2Cx$
- C. $Cx^{3/3}$
- D. $-Cx^{3/3}$
- E. $-3Cx^3$

ans: D

61. The work required to carry a particle with a charge of 6.0C from a 5.0-V equipotential surface to a 6.0-V equipotential surface and back again to the 5.0-V surface is:

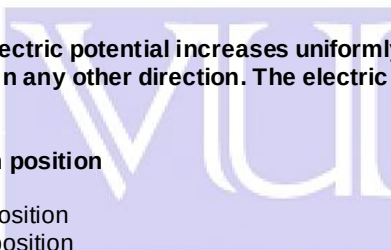
- A. 0
- B. $1.2 \times 10^{-5} \text{ J}$
- C. $3.0 \times 10^{-5} \text{ J}$
- D. $6.0 \times 10^{-5} \text{ J}$
- E. $6.0 \times 10^{-6} \text{ J}$

ans: A

62. The equipotential surfaces associated with a charged point particles are:

- A. radially outward from the particle
- B. vertical planes
- C. horizontal planes
- D. concentric spheres centered at the particle
- E. concentric cylinders with the particle on the axis.

ans: D



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63. The electric field in a region around the origin is given by $\vec{E} = C(x\hat{i} + y\hat{j})$, where C is a constant. The equipotential surfaces in that region are:

- A. concentric cylinders with axes along the z axis
- B. concentric cylinders with axes along the x axis
- C. concentric spheres centered at the origin
- D. planes parallel to the xy plane
- E. planes parallel to the yz plane

ans: A

64. Room temperature is about 20 degrees on the:

Select correct option:

Kelvin scale

Celsius scale

Fahrenheit scale

Absolute scale

65. A particle with zero mass and energy E carries momentum:

Select correct option:

E/c

E/c^2

vEc

E/c

66. The quantum number m_s is most closely associated with what property of the electron in an atom?

Select correct option:

Magnitude of the orbital angular momentum

Energy

z component of the spin angular momentum

z component of the orbital angular momentum

67. J.J. Thompson's measurement of e/m for electrons provides evidence of the:

Select correct option:

Wave nature of matter

Particle nature of matter

Wave nature of radiation

Particle nature of radiation

68. During a slow adiabatic expansion of a gas:

Select correct option:

The pressure remains constant

Energy is added as heat

Work is done on the gas

No energy enters or leaves as heat

69. The electric potential in a certain region of space is given by $V = -7.5x^2 + 3x$, where V is in volts and x is in meters. In this region the equipotential surfaces are:

- A. planes parallel to the x axis
- B. planes parallel to the yz plane
- C. concentric spheres centered at the origin
- D. concentric cylinders with the x axis as the cylinder axis
- E. unknown unless the charge is given

ans: B

70. A particle with charge q is to be brought from far away to a point near an electric dipole. No work is done if the final position of the particle is on:

- A. the line through the charges of the dipole
- B. a line that is perpendicular to the dipole moment

- C. a line that makes an angle of 45° with the dipole moment
 D. a line that makes an angle of 30° with the dipole moment
 E. none of the above
 ans: B

71. Equipotential surfaces associated with an electric dipole are:

- A. spheres centered on the dipole
 B. cylinders with axes along the dipole moment
 C. planes perpendicular to the dipole moment
 D. planes parallel to the dipole moment
E. none of the above

ans: E

72. The units of capacitance are equivalent to:

- A. J/C
 B. V/C
 C. J²/C
 D. C/J
E. C²/J

ans: E

73. A farad is the same as a:

- A. J/V
 B. V/J
C. C/V
 D. V/C
 E. N/C

ans: C

74. A capacitor C “has a charge Q”. The actual charges on its plates are:

- A. Q, Q
 B. Q/2, Q/2
C. Q, -Q
 D. Q/2, -Q/2
 E. Q, 0

ans: C

75. Each plate of a capacitor stores a charge of magnitude 1mC when a 100-V potential difference is applied. The capacitance is:

- A. 5 μF
B. 10 μF
 C. 50 μF
 D. 100 μF
 E. none of these

ans: B

76. To charge a 1-F capacitor with 2C requires a potential difference of:

- A. 2V**
 B. 0.2V
 C. 5V
 D. 0.5V
 E. none of these

ans: A

77. The capacitance of a parallel-plate capacitor with plate area A and plate separation d is given by:

- A. $\epsilon_0 d/A$
 B. $\epsilon_0 d/2A$
C. $\epsilon_0 A/d$
 D. $\epsilon_0 A/2d$
 E. Ad/ϵ_0

ans: C

78. The capacitance of a parallel-plate capacitor is:

- A. proportional to the plate area**
 B. proportional to the charge stored
 C. independent of any material inserted between the plates
 D. proportional to the potential difference of the plates



E. proportional to the plate separation

ans: A

79. The plate areas and plate separations of five parallel plate capacitors are

capacitor 1: area A_0 , separation d_0

capacitor 2: area $2A_0$, separation $2d_0$

capacitor 3: area $2A_0$, separation $d_0/2$

capacitor 4: area $A_0/2$, separation $2d_0$

capacitor 5: area A_0 , separation $d_0/2$

Rank these according to their capacitances, least to greatest.

A. 1, 2, 3, 4, 5

B. 5, 4, 3, 2, 1

C. 5, 3 and 4 tie, then 1, 2

D. 4, 1 and 2 tie, then 5, 3

E. 3, 5, 1 and 2 tie, 1, 4

ans: D

80. The capacitance of a parallel-plate capacitor can be increased by:

A. increasing the charge

B. decreasing the charge

C. increasing the plate separation

D. decreasing the plate separation

E. decreasing the plate area

ans: D

81. If both the plate area and the plate separation of a parallel-plate capacitor are doubled, the capacitance is:

A. doubled

B. halved

C. unchanged

D. tripled

E. quadrupled

ans: C

82. If the plate area of an isolated charged parallel-plate capacitor is doubled:

A. the electric field is doubled

B. the potential difference is halved

C. the charge on each plate is halved

D. the surface charge density on each plate is doubled

E. none of the above

ans: B

83. If the plate separation of an isolated charged parallel-plate capacitor is doubled:

A. the electric field is doubled

B. the potential difference is halved

C. the charge on each plate is halved

D. the surface charge density on each plate is doubled

E. none of the above

ans: E

84. Pulling the plates of an isolated charged capacitor apart:

A. increases the capacitance

B. increases the potential difference

C. does not affect the potential difference

D. decreases the potential difference

E. does not affect the capacitance

ans: B

85. If the charge on a parallel-plate capacitor is doubled:

A. the capacitance is halved

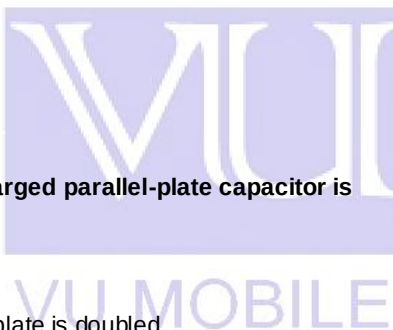
B. the capacitance is doubled

C. the electric field is halved

D. the electric field is doubled

E. the surface charge density is not changed on either plate

ans: D



86. A parallel-plate capacitor has a plate area of 0.2m^2 and a plate separation of 0.1mm . To obtain an electric field of $2.0 \times 10^6 \text{ V/m}$ between the plates, the magnitude of the charge on each plate should be:

- A. $8.9 \times 10^{-7} \text{ C}$
- B. $1.8 \times 10^{-6} \text{ C}$
- C. $3.5 \times 10^{-6} \text{ C}$
- D. $7.1 \times 10^{-6} \text{ C}$**
- E. $1.4 \times 10^{-5} \text{ C}$

ans: D

87. A parallel-plate capacitor has a plate area of 0.2m^2 and a plate separation of 0.1 mm . If the charge on each plate has a magnitude of $4 \times 10^{-6} \text{ C}$ the potential difference across the plates is approximately:

- A. 0
- B. $4 \times 10^{-2} \text{ V}$
- C. $1 \times 10^2 \text{ V}$
- D. $2 \times 10^2 \text{ V}$**
- E. $4 \times 10^8 \text{ V}$

ans: D

88. The capacitance of a spherical capacitor with inner radius a and outer radius b is proportional to:

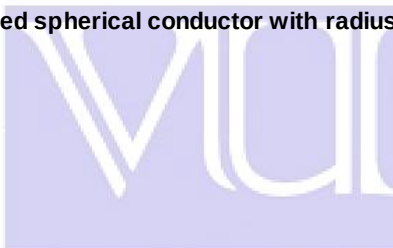
- A. a/b
- B. $b - a$
- C. $b^2 - a^2$
- D. $ab/(b - a)$**
- E. $ab/(b^2 - a^2)$

ans: D

89. The capacitance of a single isolated spherical conductor with radius R is proportional to:

- A. R**
- B. R^2
- C. $1/R$
- D. $1/R^2$
- E. none of these

ans: A



90. The capacitance of a cylindrical capacitor can be increased by:

- A. decreasing both the radius of the inner cylinder and the length
- B. increasing both the radius of the inner cylinder and the length**
- C. increasing the radius of the outer cylindrical shell and decreasing the length
- D. decreasing the radius of the inner cylinder and increasing the radius of the outer cylindrical shell
- E. only by decreasing the length

ans: B

91. A battery is used to charge a series combination of two identical capacitors. If the potential difference across the battery terminals is V and total charge Q flows through the battery during the charging process then the charge on the positive plate of each capacitor and the potential difference across each capacitor are:

- A. $Q/2$ and $V/2$, respectively
- B. Q and V , respectively
- C. $Q/2$ and V , respectively
- D. Q and $V/2$, respectively**
- E. Q and $2V$, respectively

ans: D

92. A battery is used to charge a parallel combination of two identical capacitors. If the potential difference across the battery terminals is V and total charge Q flows through the battery during the charging process then the charge on the positive plate of each capacitor and the potential difference across each capacitor are:

- A. $Q/2$ and $V/2$, respectively
- B. Q and V , respectively
- C. $Q/2$ and V , respectively**
- D. Q and $V/2$, respectively
- E. Q and $2V$, respectively

ans: C

93. A $2\text{-}\mu\text{F}$ and a $1\text{-}\mu\text{F}$ capacitor are connected in series and a potential difference is applied across the combination. The $2\text{-}\mu\text{F}$ capacitor has:

- A. twice the charge of the $1\text{-}\mu\text{F}$ capacitor
- B. half the charge of the $1\text{-}\mu\text{F}$ capacitor
- C. twice the potential difference of the $1\text{-}\mu\text{F}$ capacitor
- D. half the potential difference of the $1\text{-}\mu\text{F}$ capacitor**
- E. none of the above

ans: D

94. A $2\text{-}\mu\text{F}$ and a $1\text{-}\mu\text{F}$ capacitor are connected in parallel and a potential difference is applied across the combination. The $2\text{-}\mu\text{F}$ capacitor has:

- A. twice the charge of the $1\text{-}\mu\text{F}$ capacitor**
- B. half the charge of the $1\text{-}\mu\text{F}$ capacitor
- C. twice the potential difference of the $1\text{-}\mu\text{F}$ capacitor
- D. half the potential difference of the $1\text{-}\mu\text{F}$ capacitor
- E. none of the above

ans: A

95. Let Q denote charge, V denote potential difference, and U denote stored energy. Of these quantities, capacitors in series must have the same:

- A. Q only**
- B. V only
- C. U only
- D. Q and U only
- E. V and U only

ans: A

96. Let Q denote charge, V denote potential difference, and U denote stored energy. Of these quantities, capacitors in parallel must have the same:

- A. Q only
- B. V only**
- C. U only
- D. Q and U only
- E. V and U only

ans: B

97. Capacitors C_1 and C_2 are connected in parallel. The equivalent capacitance is given by:

- A. $C_1 C_2 / (C_1 + C_2)$
- B. $(C_1 + C_2) / C_1 C_2$
- C. $1 / (C_1 + C_2)$
- D. C_1 / C_2
- E. $C_1 + C_2$**

ans: E

98. Capacitors C_1 and C_2 are connected in series. The equivalent capacitance is given by:

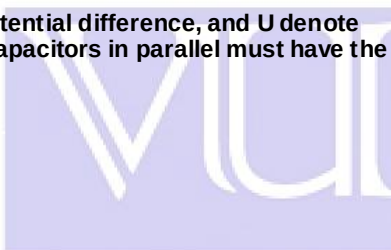
- A. $C_1 C_2 / (C_1 + C_2)$**
- B. $(C_1 + C_2) / C_1 C_2$
- C. $1 / (C_1 + C_2)$
- D. C_1 / C_2
- E. $C_1 + C_2$

ans: A

99. Capacitors C_1 and C_2 are connected in series and a potential difference is applied to the combination. If the capacitor that is equivalent to the combination has the same potential difference, then the charge on the equivalent capacitor is the same as:

- A. the charge on C_1**
- B. the sum of the charges on C_1 and C_2
- C. the difference of the charges on C_1 and C_2
- D. the product of the charges on C_1 and C_2
- E. none of the above

ans: A



100. Capacitors C1 and C2 are connected in parallel and a potential difference is applied to the combination. If the capacitor that is equivalent to the combination has the same potential difference, then the charge on the equivalent capacitor is the same as:

- A. the charge on C1
- B. the sum of the charges on C1 and C2**
- C. the difference of the charges on C1 and C2
- D. the product of the charges on C1 and C2
- E. none of the above

ans: B

101. Two identical capacitors are connected in series and two, each identical to the first, are connected in parallel. The equivalent capacitance of the series connection is the equivalent capacitance of parallel connection.

- A. twice
- B. four times
- C. half
- D. one-fourth**
- E. the same as

ans: D

102. Two identical capacitors, each with capacitance C, are connected in parallel and the combination is connected in series to a third identical capacitor. The equivalent capacitance of this arrangement is:

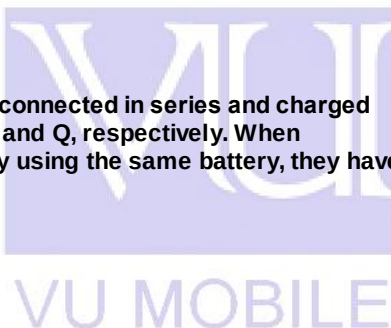
- A. $2C/3$**
- B. C
- C. $3C/2$
- D. 2C
- E. 3C

ans: A

103. A $2\text{-}\mu\text{F}$ and a $1\text{-}\mu\text{F}$ capacitor are connected in series and charged from a battery. They store charges P and Q, respectively. When disconnected and charged separately using the same battery, they have charges R and S, respectively. Then:

- A. $R > S > Q = P$**
- B. $P > Q > R = S$
- C. $R > P = Q > S$
- D. $R = P > S = Q$
- E. $R > P > S = Q$

ans: A



104. A 20-F capacitor is charged to 200V. Its stored energy is:

- A. 4000 J
- B. 4 J
- C. 0.4J**
- D. 2000 J
- E. 0.1J

ans: C

105. A charged capacitor stores 10C at 40V. Its stored energy is:

- A. 400 J
- B. 4 J
- C. 0.2J
- D. 2.5J
- E. 200 J**

ans: E

106. A $2\text{-}\mu\text{F}$ and a $1\text{-}\mu\text{F}$ capacitor are connected in series and charged by a battery. They store energies P and Q, respectively. When disconnected and charged separately using the same battery, they store energies R and S, respectively. Then:

- A. $R > P > S > Q$
- B. $P > Q > R > S$
- C. $R > P > Q > S$
- D. $P > R > S > Q$
- E. $R > S > Q > P$**

ans: E

107. The quantity $(1/2)QE^2$ has the significance of:

- A. energy/farad
- B. energy/coulomb
- C. energy
- D. energy/volume**
- E. energy/volt

ans: D

108. Capacitors A and B are identical. Capacitor A is charged so it stores 4 J of energy and capacitor B is uncharged. The capacitors are then connected in parallel. The total stored energy in the capacitors is now:

- A. 16 J
- B. 8 J
- C. 4 J
- D. 2 J**
- E. 1 J

ans: D

109. To store a total of 0.040 J of energy in the two identical capacitors shown, each should have a capacitance of: 200V

- A. 0.10 μF
- B. 0.50 μF
- C. 1.0 μF**
- D. 1.5 μF
- E. 2.0 μF

ans: C

110. A battery is used to charge a parallel-plate capacitor, after which it is disconnected. Then the plates are pulled apart to twice their original separation. This process will double the:

- A. capacitance
- B. surface charge density on each plate
- C. stored energy**
- D. electric field between the two plates
- E. charge on each plate

ans: C

111. A parallel-plate capacitor has a plate area of 0.3m^2 and a plate separation of 0.1 mm. If the charge on each plate has a magnitude of $5 \times 10^{-6}\text{ C}$ then the force exerted by one plate on the other has a magnitude of about:

- A. 0
- B. 5N**
- C. 9N
- D. $1 \times 10^4\text{ N}$
- E. $9 \times 10^5\text{ N}$

ans: B

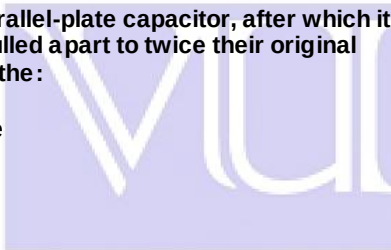
112. A certain capacitor has a capacitance of 5.0 μF . After it is charged to 5.0 μC and isolated, the plates are brought closer together so its capacitance becomes 10 μF . The work done by the agent is about:

- A. zero
- B. $1.25 \times 10^{-6}\text{ J}$
- C. $-1.25 \times 10^{-6}\text{ J}$**
- D. $8.3 \times 10^{-7}\text{ J}$
- E. $-8.3 \times 10^{-7}\text{ J}$

ans: C

113. A dielectric slab is slowly inserted between the plates of a parallel plate capacitor, while the potential difference between the plates is held constant by a battery. As it is being inserted:

- A. the capacitance, the potential difference between the plates, and the charge on the positive plate all increase
- B. the capacitance, the potential difference between the plates, and the charge on the positive plate all decrease
- C. the potential difference between the plates increases, the charge on the positive plate decreases, and the capacitance remains the same
- D. the capacitance and the charge on the positive plate decrease but the potential difference between the plates remains the same



E. the capacitance and the charge on the positive plate increase but the potential difference between the plates remains the same

ans: E

114. An air-filled parallel-plate capacitor has a capacitance of 1 pF. The plate separation is then doubled and a wax dielectric is inserted, completely filling the space between the plates. As a result, the capacitance becomes 2 pF. The dielectric constant of the wax is:

- A. 0.25
- B. 0.5
- C. 2.0
- D. 4.0**
- E. 8.0

ans: D

115. One of materials listed below is to be placed between two identical metal sheets, with no, air gap, to form a parallel-plate capacitor. Which produces the greatest capacitance?

- A. material of thickness 0.1mm and dielectric constant 2
- B. material of thickness 0.2mm and dielectric constant 3
- C. material of thickness 0.3mm and dielectric constant 2
- D. material of thickness 0.4mm and dielectric constant 8
- E. material of thickness 0.5mm and dielectric constant 11**

ans: E

116. Two capacitors are identical except that one is filled with air and the other with oil. Both capacitors carry the same charge. The ratio of the electric fields E_{air}/E_{oil} is:

- A. between 0 and 1
- B. 0
- C. 1
- D. between 1 and infinity**
- E. infinite

ans: D

117. A parallel-plate capacitor, with air dielectric, is charged by a battery, after which the battery is disconnected. A slab of glass dielectric is then slowly inserted between the plates. As it is being inserted:

- A. a force repels the glass out of the capacitor
- B. a force attracts the glass into the capacitor**
- C. no force acts on the glass
- D. a net charge appears on the glass
- E. the glass makes the plates repel each other

ans: B

118. Two parallel-plate capacitors with the same plate separation but different capacitance are connected in parallel to a battery. Both capacitors are filled with air. The quantity that is NOT the same for both capacitors when they are fully charged is:

- A. potential difference
- B. energy density
- C. electric field between the plates
- D. charge on the positive plate**
- E. dielectric constant

ans: D

119. Two parallel-plate capacitors with the same plate area but different capacitance are connected in parallel to a battery. Both capacitors are filled with air. The quantity that is the same for both capacitors when they are fully charged is:

- A. potential difference**
- B. energy density
- C. electric field between the plates
- D. charge on the positive plate
- E. plate separation

ans: A

120. Two parallel-plate capacitors with different plate separation but the same capacitance are connected in series to a battery. Both capacitors are filled with air. The quantity that is NOT the same for both capacitors when they are fully charged is:

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- A. potential difference
 - B. stored energy
 - C. electric field between the plates**
 - D. charge on the positive plate
 - E. dielectric constant
- ans: C

121. Two parallel-plate capacitors with different capacitance but the same plate separation are connected in series to a battery. Both capacitors are filled with air. The quantity that is the same for both capacitors when they are fully charged is:

- A. potential difference
 - B. stored energy
 - C. energy density
 - D. electric field between the plates
 - E. charge on the positive plate**
- ans: E

122. A car battery is rated at 80A · h. An ampere-hour is a unit of:

- A. power
 - B. energy
 - C. current
 - D. charge**
 - E. force
- ans: D

123. Current has units:

- A. kilowatt-hour
 - B. coulomb/second**
 - C. coulomb
 - D. volt
 - E. ohm
- ans: B

124. Current has units:

- A. kilowatt-hour
 - B. ampere**
 - C. coulomb
 - D. volt
 - E. ohm
- ans: B



125. The units of resistivity are:

- A. ohm
 - B. ohm·meter**
 - C. ohm/meter
 - D. ohm/meter²
 - E. none of these
- ans: B

126. The rate at which electrical energy is used may be measured in:

- A. watt/second
 - B. watt·second
 - C. watt**
 - D. joule·second
 - E. kilowatt-hour
- ans: C

127. Energy may be measured in:

- A. kilowatt
 - B. joule·second
 - C. watt
 - D. watt·second**
 - E. volt/ohm
- ans: D

128. Which one of the following quantities is correctly matched to its unit?

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- A. Power – kW·h
 - B. Energy – kW
 - C. Potential difference – J/C**
 - D. Current – A/s
 - E. Resistance – V/C
- ans: C

129. Current is a measure of:

- A. force that moves a charge past a point
 - B. resistance to the movement of a charge past a point
 - C. energy used to move a charge past a point
 - D. amount of charge that moves past a point per unit time**
 - E. speed with which a charge moves past a point
- ans: D

130. A 60-watt light bulb carries a current of 0.5A. The total charge passing through it in one hour is:

- A. 120C
 - B. 3600C
 - C. 3000C
 - D. 2400C
 - E. 1800C**
- ans: E

The number of significant figures in 0.00150 is:

- ▶ 5
- ▶ 4
- ▶ 3**
- ▶ 2

One revolution is the same as:

- ▶ 1 rad
- ▶ 57 rad
- ▶ $\pi/2$ rad
- ▶ π rad
- ▶ 2π rad**



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A body to be in equilibrium under the combined action of several forces:

- ▶ All the forces must be applied at the same point
- all the forces must be applied at the same point
- ▶ all of the forces form pairs of equal and opposite forces
- ▶ any two of these forces must be balanced by a third force
- ▶ the sum of the torques about any point must equal zero**

A bucket of water is pushed from left to right with increasing speed across a horizontal surface. Consider the pressure at two points at the same level in the water.

- ▶ It is the same
- ▶ It is higher at the point on the left**
- ▶ It is higher at the point on the right
- ▶ At first it is higher at the point on the left but as the bucket speeds up it is lower there

An organ pipe with both ends open is 0.85m long. Assuming that the speed of sound is 340m/s, the frequency of the third harmonic of this pipe is:

- ▶ A. 200 Hz
- ▶ B. 300 Hz
- ▶ C. 400 Hz
- ▶ D. 600 Hz**

Capacitors C1 and C2 are connected in series. The equivalent capacitance is given by

- ▶ $C_1 C_2 / (C_1 + C_2)$**
- ▶ $(C_1 + C_2) / C_1 C_2$

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- ▶ $1/(C_1 + C_2)$
- ▶ C_1/C_2

If the potential difference across a resistor is doubled:

- ▶ only the current is doubled
- ▶ only the current is halved
- ▶ only the resistance is doubled
- ▶ only the resistance is halved

By using only two resistors, R_1 and R_2 , a student is able to obtain resistances of 3 Ω , 4 Ω , 12 Ω , and 16 Ω . The values of R_1 and R_2 (in ohms) are:

- ▶ 3, 4
- ▶ 2, 12
- ▶ 3, 16
- ▶ 4, 12

Faraday's law states that an induced emf is proportional to:

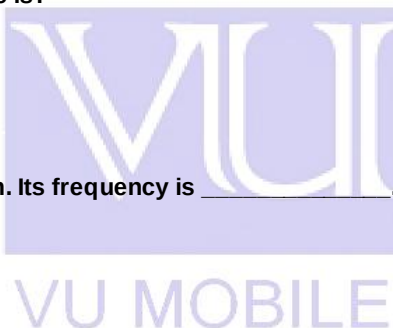
- ▶ the rate of change of the electric field
- ▶ the rate of change of the magnetic flux
- ▶ the rate of change of the electric flux
- ▶ the rate of change of the magnetic field

A generator supplies 100V to the primary coil of a transformer. The primary has 50 turns and the secondary has 500 turns. The secondary voltage is:

- ▶ 1000V
- ▶ 500V
- ▶ 250V
- ▶ 100V

The wavelength of red light is 700 nm. Its frequency is _____.

- ▶ 4.30×10^4 Hertz
- ▶ 4.30×10^3 Hertz
- ▶ 4.30×10^5 Hertz
- ▶ 4.30×10^2 Hertz



A laser in a compact disc player generates light that has a wavelength of 780 nm in air. The light then enters into the plastic of a CD. If the index of refraction of plastic is 1.55, the speed of this light once enter the plastic is _____.

- ▶ 3.00×10^8 m/s
- ▶ 1.94×10^8 m/s
- ▶ 4.29×10^8 km/h
- ▶ 3.00×10^8 km/h

Which of the following electromagnetic radiations has photons with the greatest energy?

- ▶ blue light
- ▶ yellow light
- ▶ x rays
- ▶ radio waves

A virtual image is one:

- ▶ toward which light rays converge but do not pass through
- ▶ from which light rays diverge as they pass through
- ▶ toward which light rays converge and pass through
- ▶ from which light rays diverge but do not pass through

What is the unit of magnification factor?

- ▶ meter.Kelvin

- ▶ radian.Kelvin
- ▶ degree.Kelvin
- ▶ no units

During an adiabatic process an object does 100 J of work and its temperature decreases by 5K. During another process it does 25 J of work and its temperature decreases by 5 K. Its heat capacity for the second process is.

- ▶ 20 J/K
- ▶ 100 J/K
- ▶ 15 J/K
- ▶ 5 J/K

An ideal gas expands into a vacuum in a rigid vessel. As a result there is:

- ▶ a change in entropy
- ▶ a decrease of internal energy
- ▶ an increase of pressure
- ▶ a change in temperature

The Stern-Gerlach experiment makes use of:

- ▶ a strong uniform magnetic field
- ▶ a strong non-uniform magnetic field
- ▶ a strong uniform electric field
- ▶ a strong non-uniform electric field

A large collection of nuclei are undergoing alpha decay. The rate of decay at any instant is proportional to:

- ▶ the number of undecayed nuclei present at that instant
- ▶ the time since the decays started
- ▶ the time remaining before all have decayed
- ▶ the half-life of the decay

As a 2.0-kg block travels around a 0.50-m radius circle it has an angular speed of 12 rad/s. The circle is parallel to the xy plane and is centered on the z axis, a distance of 0.75m from the origin. The z component of the angular momentum around the origin is:

- ▶ 6.0kg · m²/s
- ▶ 9.0kg · m²/s
- ▶ 11 kg · m²/s
- ▶ 14 kg · m²/s

A net torque applied to a rigid object always tends to produce:

- ▶ linear acceleration
- ▶ rotational equilibrium
- ▶ angular acceleration
- ▶ rotational inertia

An object attached to one end of a spring makes 20 vibrations in 10 s. Its angular frequency is:

- ▶ 1.57 rad/s
- ▶ 2.0 rad/s
- ▶ 6.3 rad/s
- ▶ 12.6 rad/s

In simple harmonic motion, the restoring force must be proportional to the:

- ▶ amplitude
- ▶ frequency
- ▶ velocity
- ▶ displacement



Mercury is a convenient liquid to use in a barometer because:

- ▶ it is a metal
- ▶ it has a high boiling point
- ▶ it expands little with temperature
- ▶ it has a high density

The units of the electric field are:

- ▶ J/m
- ▶ J/(C·m)
- ▶ N/C
- ▶ J·C

A farad is the same as a

- ▶ J/V
- ▶ V/J
- ▶ C/V
- ▶ V/C

We desire to make an LC circuit that oscillates at 100 Hz using an inductance of 2.5H. We also need a capacitance of:

- ▶ 1 F
- ▶ 1mF
- ▶ 1 μ F
- ▶ 100 μ F

Which of the following statements is NOT TRUE about electromagnetic waves?

- ▶ Electromagnetic waves satisfy the Maswell's Equation.
- ▶ Electromagnetic waves can not travel through space.
- ▶ The receptions of electromagnetic waves require an antenna.
- ▶ The electromagnetic radiation from a burning candle is unpolarized.

Radio waves and light waves are _____.

- ▶ Longitudinal waves
- ▶ Transverse waves
- ▶ Electromagnetic and transverse both
- ▶ Electromagnetic and longitudinal both

Wien's Law states that, $\lambda_{max} =$ _____ K.

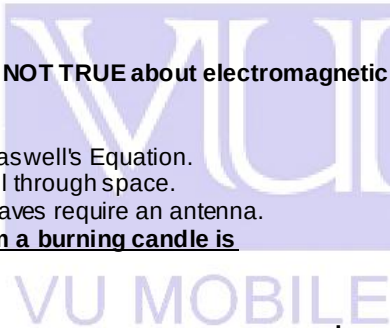
- ▶ 2.90×10^{-3} Hertz
- ▶ 2.90×10^{-3} s
- ▶ 2.90×10^{-3} kg
- ▶ 2.90×10^{-3} m

Interference of light is evidence that:

- ▶ the speed of light is very large
- ▶ light is a transverse wave
- ▶ light is a wave phenomenon
- ▶ light is electromagnetic in character

Fahrenheit and Kelvin scales agree numerically at a reading of:

- ▶ -40
- ▶ 0
- ▶ 273
- ▶ 574



According to the theory of relativity:

- ▶ moving clocks run fast
- ▶ energy is not conserved in high speed collisions
- ▶ the speed of light must be measured relative to the ether
- ▶ **none of the above are true**

Light from a stationary spaceship is observed, and then the spaceship moves directly away from the observer at high speed while still emitting the light. As a result, the light seen by the observer has:

- ▶ higher frequency and a longer wavelength than before
- ▶ **lower frequency and a shorter wavelength than before** (Not Sure)
- ▶ higher frequency and a shorter wavelength than before
- ▶ lower frequency and a longer wavelength than before

How fast should you move away from a 6.0×10^{14} Hz light source to observe waves with a frequency of 4.0×10^{14} Hz?

- ▶ 0.20c
- ▶ **0.38c**
- ▶ 0.45c
- ▶ 0.51c

The quantum number n is most closely associated with what property of the electron in a hydrogen atom?

- ▶ **Energy**
- ▶ Orbital angular momentum
- ▶ Spin angular momentum
- ▶ Magnetic moment

The quantum number m_s is most closely associated with what property of the electron in an atom?

- ▶ Magnitude of the orbital angular momentum
- ▶ Energy
- ▶ **z component of the spin angular momentum**
- ▶ z component of the orbital angular momentum

As the wavelength of a wave in a uniform medium increases, its speed will ____.

- ▶ Decrease
- ▶ Increase
- ▶ **Remain the same**
- ▶ None of these

Question # 1 of 5 (Start time: 05:02:08 PM) Total Marks: 1

A force of 5000N is applied outwardly to each end of a 5.0-m long rod with a radius of 34.0 cm and a Young's modulus of 125×10^8 N/m². The elongation of the rod is:

Select correct option:

- 0.0040mm
- 0.14mm
- 0.55mm (Correct)**
- 1.42mm

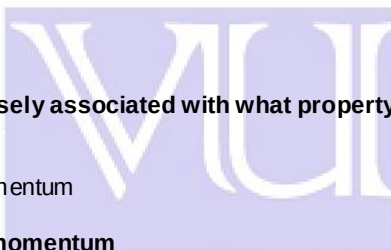
An object attached to one end of a spring makes 20 complete oscillations in 10 s. Its period is:

Select correct option:

- 2Hz
- 0.5 s (Correct)**
- 0.5Hz
- 2 s

Question # 3 of 5 (Start time: 05:04:59 PM) Total Marks: 1

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back and forth in a leftward and rightward direction. This type of wave is known as a ____.

Select correct option:

- Mechanical
- Electromagnetic
- Transverse
- Longitudinal (Correct)**

Question # 4 of 5 (Start time: 05:06:27 PM) Total Marks: 1

Which of the following statements about completely submerged objects resting on the ocean bottom is correct?

Select correct option:

- The buoyant force acting on the object is equal to the object's weight.
- The apparent weight of the object depends on the object's density. (Correct)**
- The displaced volume of fluid is greater than the volume of the object.
- The weight of the object and the buoyant force are equal and opposite.

Question # 5 of 5 (Start time: 05:08:03 PM) Total Marks: 1

The flow rate of blood through the average human aorta is about $9.0 \times 10^1 \text{ cm}^3/\text{s}$. If the aorta has a radius of 1.0 cm, what is the velocity of the blood flow?

Select correct option:

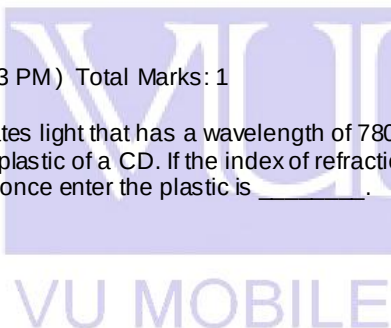
- 14 cm/s
- 32 cm/s
- 37 cm/s
- 29 cm/s (Correct)**

Question # 1 of 10 (Start time: 09:42:03 PM) Total Marks: 1

A laser in a compact disc player generates light that has a wavelength of 780 nm in air. The light then enters into the plastic of a CD. If the index of refraction of plastic is 1.55, the speed of this light once enter the plastic is ____.

Select correct option:

- $3.00 \times 10^8 \text{ m/s}$
- $1.94 \times 10^8 \text{ m/s}$ (Correct)**
- $4.29 \times 10^8 \text{ km/h}$
- $3.00 \times 10^8 \text{ km/h}$



Question # 2 of 10 (Start time: 09:42:41 PM) Total Marks: 1

The quantum number m_s is most closely associated with what property of the electron in an atom?

Select correct option:

- Magnitude of the orbital angular momentum
- Energy
- z component of the spin angular momentum (Correct)**
- z component of the orbital angular momentum

Question # 3 of 10 (Start time: 09:43:13 PM) Total Marks: 1

Metal pipes, used to carry water, sometimes burst in the winter because:

Select correct option:

- Metal contracts more than water
- Outside of the pipe contracts more than the inside
- Metal becomes brittle when cold
- Water expands when it freezes (Correct)**

Question # 4 of 10 (Start time: 09:44:19 PM) Total Marks: 1

An erect object is in front of a convex mirror a distance greater than the focal length. The image is:

Select correct option:

Real, inverted, and smaller than the object
 Virtual, inverted, and larger than the object
 Real, inverted, and larger than the object
Virtual, erect, and smaller than the object (Correct)

Question # 5 of 10 (Start time: 09:45:48 PM) Total Marks: 1

Select the correct statement:
 Select correct option:

Ultraviolet light has a longer wavelength than infrared (Correct)

Blue light has a higher frequency than x rays
 Radio waves have higher frequency than gamma rays
 Gamma rays have higher frequency than infrared waves

Question # 6 of 10 (Start time: 09:46:50 PM) Total Marks: 1

A virtual image is one:
 Select correct option:

toward which light rays converge but do not pass through
from which light rays diverge but do not pass through (Correct)
 from which light rays diverge as they pass through
 toward which light rays converge and pass through

Question # 7 of 10 (Start time: 09:47:39 PM) Total Marks: 1

The wavelength of light beam A is twice the wavelength of light beam B. The energy of a photon in beam A is:
 Select correct option:

half the energy of a photon in beam B (Correct)

one-fourth the energy of a photon in beam B
 equal to the energy of a photon in beam B
 twice the energy of a photon in beam B

Question # 8 of 10 (Start time: 09:49:09 PM) Total Marks: 1

Evidence for the wave nature of matter is:
 Select correct option:

Electron diffraction experiments of Davisson and Germer (Correct)

Thompson's measurement of e/m
 Young's double slit experiment
 The Compton effect

Question # 9 of 10 (Start time: 09:50:36 PM) Total Marks: 1

Evidence that a gas consists mostly of empty space is the fact that:
 Select correct option:

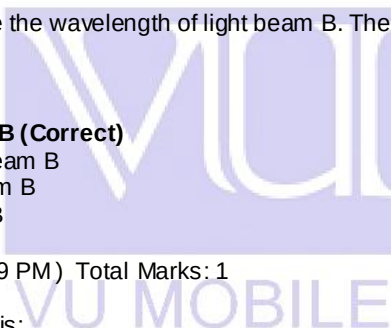
The density of a gas becomes much greater when it is liquefied (Correct)

Gases exert pressure on the walls of their containers
 Gases are transparent
 Heating a gas increases the molecular motion

Question # 10 of 10 (Start time: 09:51:53 PM) Total Marks: 1

In a photoelectric effect experiment at a frequency above cut off, the stopping potential is proportional to:
 Select correct option:

the energy of the least energetic electron before it is ejected
 the energy of the least energetic electron after it is ejected
 the energy of the most energetic electron before it is ejected



the energy of the most energetic electron after it is ejected (Correct)

X



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SOLVED BY: NAJAM AHMED

PHY101 MCQS 22 TO 45 LECTURE WISE BY NAJAM AHMED

LECTURE 22

the force of attraction or repulsion acting along a straight line between two electric charges is directly proportional to the product of the charges and inversely to the square of the distance between them is called:

Ohm law

Columb's law [check this](#)

Ainstain law

None of the given

The constant of proportionality will take different values depending upon the:

Law

Mass

quantity

units pg#61

MKS system, charge is measured in:

Ohm law

Columb pg#61

Ainstain law

None of the given

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Charge is quantized. This means that charge comes in..... unit/s:

Certain pg#61

One

Two

Three

charge is never:

created or destroyed

created

destroyed

created or destroyed both pg#61

the total charge at an earlier time is equal to the charge at a

later time pg#61

The electric field is also an example of a

vector field pg#62

Scalar field

Magnetic field

None

It is easy to find the torque experienced by an electric dipole that is placed in a uniform electric field

True pg#63

false

LECTURE 23

when charges are continuously distributed over some region of space, For this, we need to break up the region into little pieces to calculate:

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magnetic field

both

electric field pg#64

none of the given

The..... of any vector field is a particularly important concept.

Flux pg#65

Point

Direction

Magnitude

..... is the measure of the "flow" or penetration of the field vectors through an imaginary fixed surface

Flux pg#65

Point

Direction

Magnitude

LECTURE 24

The electric potential (or simply potential) is the energy of a unit charge in an:

electric field pg#68

magnetic field

both

none

Potentials are more positive in regions which have more positive charge.

True pg#68

False

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The electric potential is a scalar quantity

True pg#68

False

The electric potential exists only because the electrostatic force is conservative.

True pg#68

False

LECTURE 25

The electric field comes from the charges that have been pushed to the plates by the battery

True pg#69

false

The amount of charge pushed on to the conductors is proportional to the potential difference between the battery terminals.

True pg#69

false

When a battery is connected to a capacitor, positive and negative charges appear on the opposite plates

True pg#71

False

LECTURE 26

Current flows because something forces it around a circuit.

True pg#73

False

EMF stands for: electromotive force.

True pg#73

False

EMF is not a force.

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True pg#73

False

..... is the difference in electric potentials between two parts of a circuit.

EMF pg#73

Electric force

Magnetic field

None of the given

K The sum of the potential differences encountered in moving around a closed circuit is zero. Is known as Kirchhoff's Law

True pg#75

False

We can apply Kirchhoff's Law to a circuit that consists of a resistor and capacitor in order to see how current flows through it

True pg#75

False

LECTURE 27

The magnetic field exerts a force upon any charge that moves in the

Circle

Line

medium

field pg#77

The unit of magnetic field that is used most commonly is the tesla.

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True pg#77

False

electric force and magnetic force are very different

True pg#77

False

The electric force is non-zero even if the charge is stationary

True pg#77

False

The Lorentz Force can be used to select charged particles of whichever velocity we want.

True pg#77

False

A magnetic field can be strong enough to lift an elephant

True pg#78

False

magnetic field can never increase or decrease the energy of a particle.

True pg#78

False

The fact that a magnetic field bends charged particles is responsible for shielding the earth from harmful effects of the "solar wind".

True pg#78

False

A large number of charged particles are released from the sun and reach the earth. These can destroy

Earth

Moon

Planets

Life pg#78

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A current that goes around a loop (any shape) produces a

Pulse

Electric field

None of the given

magnetic field pg#79

Magnetic fields are produced by currents.

True pg#79

False

LECTURE 28

A fundamental law of magnetism states that the net flux through a closed surface is always

one

zero pg#81

three

two

when the magnetic flux changes in a circuit, an electro motive force is induced which is proportional to the rate of change of flux is known as Faraday's Law for Induced EMF.

True pg#82

False

LECTURE 29

Alternating current (AC) is current that flows first in one direction along a wire, and then in the reverse direction.

True pg#85

False

square of any AC wave is always.....Therefore its average is not zero.

negative

equal

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none of the given

positive pg#85

AC is generated by a coil rotating in a magnetic field

True pg#86

False

3. AC is particular useful because make it possible to.....voltages.

step up or step down pg#86

step up

step down

none

The basic transformer consists of coil/s

One

Four

Two pg#86

three

The inductance (called the self-inductance if there is only one coil)

True pg#86

False

The unit of inductance is called Henry.

True pg#86

False

y, 1 Henry= 1 Tesla meter square/Ampere

True pg#87

False

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Inductance, like capacitance, is purely geometrical and depends only upon the shape and sizes of wires. It does not depend on the current.

True pg#87

False

When we pass current through an inductor a magnetic field is produced.

Constant

Changing pg#88

Equal

None of the given

energy can be stored in a capacitor as well as in an inductor

True pg#88

False

LECTURE 30

But Maxwell realized that the above 4 (amperes, faraday's, gauss's law) were not consistent with the conservation of charge,

True pg#90

False

the electromagnetic waves inside a micro wave oven have wavelength of 6 cm

True pg#91

False

radio waves are a few metres long

True pg#91

False

The production of electromagnetic waves is done by forcing current to vary rapidly in a small piece of wire

True pg#92

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False

The reception of electromagnetic waves requires an

Receiver

Device

Tv

Antenna pg#93

The incoming wave has an electric field that forces the electrons to run up and down the

antenna wire pg#93

Receiver

Device

None

electric field of a wave is perpendicular to the direction of its motion

true pg#93

false

LECTURE 31

Light travels very fast but its speed is not

Finit

Constant

Vary

Infinite pg#94

<https://welcometogameslab.blogspot.com/>

Light is electromagnetic wave

True pg#94

False

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different wavelength correspond to different colours

True pg#94

False

If light contained all frequencies with equal strength, it would appear as to us.

Black

Green

White pg#94

Yellow

The sky appears blue to us on a clear day because tiny dust particles high above in the atmosphere reflect a lot of the blue light coming from the sun

True pg#94

False

The speed of light in vacuum is a fixed constant of nature which we usually call

C pg#96

B

D

A

a medium light can travel slower or faster than:

C pg#96

B

D

A

Light coming from air into water bends toward the normal. Conversely, light from a source in the water will bend away from the normal. What if you keep increasing the angle with respect to the normal so that the light bends and begins to just follow the surface? This phenomenon is called total internal reflection and is called the critical angle.

Fibre optic cables, which are now common everywhere

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True pg#97

False

if the cable is bent, the light will continue to travel along it.

True pg#97

False

Optical fibres now carry thousands of telephone calls in a cable whose diameter is only a little bigger than a human hair!

True pg#97

False

LECTURE 32

When an object is heated, it emits light.

True pg#98

False

When the temperature is around 800 C, object is red hot.

True pg#98

False

Around 2500 C object is yellowish-white

True pg#98

False

At temperatures lower than 800 C, infrared (IR) light is emitted but our eyes cannot see this.

True pg#98

False

Each chemical element produces a very distinct pattern of colors called an emission

emission and spectrum both pg#99

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emission spectrum

spectrum

The atmosphere contains various gases which absorb light at many different

Frequencies

Wavelengths pg#100

Both above.

None

Birefringence can occur in any material that possesses some asymmetry in its structure

True pg#101

False

LECTURE 33

Coherent means that both coherent waves should have a fixed phase relative to each other

True pg#102

False

it is very.....to produce coherent light from two separate sources

difficult pg#102

simple

common

none

When light falls upon a thin film of soapy water, oil, etc. it is reflected from

two surfaces. Pg#104

Three surfaces.

Four surfaces.

None

What is diffraction?

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The bending of light around objects is known as diffraction.

LECTURE 34

Light is actually electric and magnetic waves that can travel through empty space

True pg#106

False

The electric and magnetic waves are perpendicular to each other and to the direction of travel

True pg#106

False

Explanation of the photoelectric puzzle came from Einstein

True pg#107

False

Einstein got Nobel Prize in 1905

True pg#107

False

Microwaves, radio and TV waves, X-rays, -rays, etc. are all photons

True pg#108

False

Fluorescence and phosphorence are two phenomena observed in some materials

True pg#108

False

LASER stands for: Light mplification by the timulated mission of adiation

Lasers are important because they emit a very large number of all with one single frequency

Photons pg#109

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Electrons

Both above

None

LECTURE 35

When light falls on a flat surface, the angle of incidence equals the angle of incidence

reflection pg# 110

both above

none

virtual image is actually

not a real image pg#112

real image

can be real or can't be real

none

flat surface has radius of curvature

finite

infinite pg#114

both above

none

The "strength" of a lens is measured in diopters

True pg#114

False

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LECTURE 36

heat is the flow of internal energy due to a

Positional difference

Electric flux

none

temperature difference pg#115

joule is the unit of work

True pg#117

False

K = thermal conductivity

A = cross-sectional area

L = Length

Q = Heat transferred

t = duration of heat transfer

delta T = temperature difference

the heat transferred in time is $Q = KA \left(\frac{\Delta T}{L} \right) t$, This formula allows us to measure if all the other

quantities in it are measured

true pg#120

false

Conduction is one possible way by which heat is transferred from one portion of a system to another

true pg#120

false

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LECTURE 37

Work and heat are called path variables

true pg#121

false

LECTURE38

More heat (such as inside the core of a star) will break up atomic nuclei into protons and

Electron

Neutrons pg#126

Both above

None

In statistical mechanics, we interpret entropy as the degree of

Orderd

Disorder pg#128

Both above

None

LECTURE39

The Special Theory of Relativity was created in (1995) by

Faraday's

OHM

Albert Einstein pg#129

None of the above

we measure time by looking at some phenomenon that repeats itself:

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true pg#129

false

LECTURE40

Einstein realized that the photoelectric effect could be explained in:

1903

1904

1905 pg#140

1906

The word "quantum" means:

packet or bundle

packet

bundle

both packet or bundle pg#147

Atoms or molecules can only exist in certain energy states. These are also called

"allowed levels" or quantum states.

allowed levels

quantum states

both "allowed levels" or quantum states. Pg#147

Quantum mechanics is all about probabilities

True pg#150

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false

Atoms are building blocks of the

Elements pg#153

Both above

None

All atoms of the same element have the same

Weight

Lenth

With

Mass pg#153

Atoms of different elements are:

Same

Normal

None of the given

Different pg#153

The Bohr model gave wonderful results when compared against the hydrogen spectrum

True pg#157

False

Electrons can be thought of as little spinning balls of charge.

True pg#157

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False

The diameter of the nucleus is about 10 million times smaller than the overall diameter of the atom.

True pg#161

False

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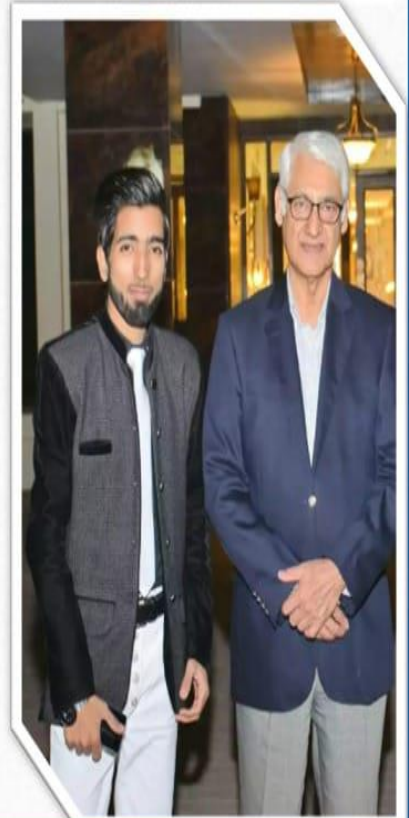
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Question No:1**(Marks:1)****Vu-Topper RM**

The image produced by a convex mirror of an erect object in front of the mirror is always:

- A. Real, erect, and larger than the object
- B. Real, erect, and smaller than the object
- C. Virtual, erect, and larger than the object
- D. Virtual, erect, and smaller than the object**

Question No:2**(Marks:1)****Vu-Topper RM**

In some movies, you sometimes see an actor looking in a mirror and you can see his face in the mirror. During the filming of this scene, what does the actor see in the mirror?

- A. His face
- B. Your face
- C. The director's face
- D. The movie camera**

Question No:3**(Marks:1)****Vu-Topper RM**

A femtometer is:

- A. 10^{-9} m
- B. 10^{-12} m
- C. 10^{-15} m**
- D. 10^{-18} m

Question No:4**(Marks:1)****Vu-Topper RM**

The "strength" of a lens is measured in _____.

- A. Meters
- B. Diopters
- C. Provatans
- D. Lense meter**

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Question No:5

(Marks:1)

Vu-Topper RM

When an object (iron/tungsten) is heated, it emits light. It emits infrared (IR) light when it is heated at a temperature _____.

A. Below 800 degree C

B. Above 2500 degree C

C. Between 800 degree C to 1600 degree C

D. Between 1600 degree C to 2500 degree C

Question No:6

(Marks:1)

Vu-Topper RM

The reason there are two slits, rather than one, in a Young's experiment is:

A. To increase the intensity

B. To create a path length difference

C. One slit is for frequency, the other for wavelength

D. One slit is for Electric fields , the other is for Magnetic fields

Question No:7

(Marks:1)

Vu-Topper RM

An electron is moving at $0.6c$. If we calculate its kinetic energy using $(1/2)mv^2$, we get a result that is:

A. Just right

B. Just half enough

C. About 28% too low

D. Twice the correct value

Question No:8

(Marks:1)

Vu-Topper RM

The theoretical upper limit for the frequency of electromagnetic waves is:

A. There is no upper limit

B. Both

C. None of these

D. Just slightly greater than that of red light

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Question No:9**(Marks:1)****Vu-Topper RM**

One revolution is the same as:

- A. 1 rad
- B. 57 rad
- C. $\pi/2$ rad
- D. 2π rad**

Question No:10**(Marks:1)****Vu-Topper RM**

For a body to be in equilibrium under the combined action of several forces:

- A. All the forces must be applied at the same point
- B. All the forces must be applied at the same point
- C. All of the forces form pairs of equal and opposite forces
- D. Any two of these forces must be balanced by a third force**

Question No:11**(Marks:1)****Vu-Topper RM**

Capacitors C1 and C2 are connected in series. The equivalent capacitance is given by

- A. $C1/C2$
- B. $1/(C1 + C2)$
- C. $C1C2/(C1 + C2)$**
- D. $(C1 + C2)/C1C2$

Question No:12**(Marks:1)****Vu-Topper RM**

If the potential difference across a resistor is doubled:

- A. Only the current is halved
- B. Only the resistance is halved
- C. Only the current is doubled**
- D. Only the resistance is doubled

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Question No:13**(Marks:1)****Vu-Topper RM**

By using only two resistors, R_1 and R_2 , a student is able to obtain resistances of 3Ω , 4Ω , 12Ω , and 16Ω . The values of R_1 and R_2 (in ohms) are:

- A. 3, 4
- B. 2, 12
- C. 3, 16
- D. 4, 12**

Question No:14**(Marks:1)****Vu-Topper RM**

Faraday's law states that an induced emf is proportional to:

- A. The rate of change of the electric flux
- B. The rate of change of the electric field
- C. The rate of change of the magnetic field
- D. The rate of change of the magnetic flux**

Question No:15**(Marks:1)****Vu-Topper RM**

A generator supplies 100V to the primary coil of a transformer. The primary has 50 turns and the secondary has 500 turns. The secondary voltage is:

- A. 500V
- B. 250V
- C. 100V
- D. 1000V**

Question No:16**(Marks:1)****Vu-Topper RM**

Which of the following electromagnetic radiations has photons with the greatest energy?

- A. X rays**
- B. Blue light
- C. Radio waves
- D. Yellow light

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Question No:17**(Marks:1)****Vu-Topper RM**

We desire to make an LC circuit that oscillates at 100 Hz using an inductance of 2.5H. We also need a capacitance of:

- A. 1 F
- B. 1mF
- C. 1 μ F
- D. 100 μ F**

Question No:18**(Marks:1)****Vu-Topper RM**

The wavelength of red light is 700 nm. Its frequency is _____.

- A. 4.30×10^4 Hertz
- B. 4.30×10^3 Hertz
- C. 4.30×10^5 Hertz**
- D. 4.30×10^2 Hertz

Question No:19**(Marks:1)****Vu-Topper RM**

Which of the following statements is NOT TRUE about electromagnetic waves?

- A. Electromagnetic waves cannot travel through space.
- B. Electromagnetic waves satisfy the Maswell's Equation.
- C. The receptions of electromagnetic waves require an antenna.
- D. The electromagnetic radiation from a burning candle is unpolarized.**

Question No:20**(Marks:1)****Vu-Topper RM**

Radio waves and light waves are

- A. Transverse waves
- B. None of the these
- C. Longitudinal waves
- D. Electromagnetic and transverse both**

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Question No:21

(Marks:1)

Vu-Topper RM

An ideal gas expands into a vacuum in a rigid vessel. As a result there is:

- A. A change in entropy**
- B. An increase of pressure
- C. A change in temperature
- D. A decrease of internal energy

Question No:22

(Marks:1)

Vu-Topper RM

The Stern-Gerlach experiment makes use of:

- A. A strong uniform electric field
- B. A strong uniform magnetic field
- C. A strong non-uniform electric field
- D. A strong non-uniform magnetic field**

Question No:23

(Marks:1)

Vu-Topper RM

A net torque applied to a rigid object always tends to produce:

- A. Rotational inertia
- B. Linear acceleration
- C. Rotational equilibrium
- D. Angular acceleration**

Question No:24

(Marks:1)

Vu-Topper RM

As the wavelength of a wave in a uniform medium increases, its speed will _____.

- A. Increase
- B. Decrease
- C. None of these
- D. Remain the same**

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Question No:25

(Marks:1)

Vu-Topper RM

An organ pipe with both ends open is 0.85m long. Assuming that the speed of sound is 340m/s, the frequency of the third harmonic of this pipe is:

- A. 200 Hz
- B. 300 Hz
- C. 400 Hz
- D. 600 Hz**

Question No:26

(Marks:1)

Vu-Topper RM

Room temperature is about 20 degrees on the:

- A. Kelvin scale
- B. Celsius scale**
- C. Absolute scale
- D. Fahrenheit scale

Question No:27

(Marks:1)

Vu-Topper RM

A particle with zero mass and energy E carries momentum:

- A. E/c
- B. E/c**
- C. E/c^2
- D. vEc

Question No:28

(Marks:1)

Vu-Topper RM

J.J.Thompson's measurement of e/m for electrons provides evidence of the:

- A. Wave nature of matter
- B. Wave nature of radiation
- C. Particle nature of matter**
- D. Particle nature of radiation

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Question No:29**(Marks:1)****Vu-Topper RM**

During a slow adiabatic expansion of a gas:

- A. Energy is added as heat
- B. Work is done on the gas
- C. The pressure remains constant
- D. No energy enters or leaves as heat**

Question No:30**(Marks:1)****Vu-Topper RM**

A force of 5000N is applied outwardly to each end of a 5.0-m long rod with a radius of 34.0 cm and a Young's modulus of $125 \times 10^8 \text{ N/m}^2$.

The elongation of the rod is:

- A. 0.55mm**
- B. 1.42mm
- C. 2.24mm
- D. 0.56mm

Question No:31**(Marks:1)****Vu-Topper RM**

An object attached to one end of a spring makes 20 complete oscillations in 10 s. Its period is: Select correct option:

- A. 2 s
- B. 2Hz
- C. 0.5 s**
- D. 0.5Hz

Question No:32**(Marks:1)****Vu-Topper RM**

back and forth in a leftward and rightward direction. This type of wave is known as a

- A. Transverse
- B. Mechanical
- C. Longitudinal**
- D. Electromagnetic

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Question No:33

(Marks:1)

Vu-Topper RM

The flow rate of blood through the average human aorta is about $9.0 \times 10^3 \text{ cm}^3/\text{s}$. If the aorta has a radius of 1.0 cm, what is the velocity of the blood flow?

- A. 14 cm/s
- B. 32 cm/s
- C. 37 cm/s
- D. 29 cm/s**

Question No:34

(Marks:1)

Vu-Topper RM

Metal pipes, used to carry water, sometimes burst in the winter because:

- A. Metal contracts more than water
- B. Metal becomes brittle when cold
- C. Water expands when it freezes**
- D. Outside of the pipe contracts more than the inside

Question No:35

(Marks:1)

Vu-Topper RM

Which one of the following is in the order of decreasing frequency?

- A. Ultraviolet rays
- B. Visible light
- C. Radio waves
- D. All**

Question No:36

(Marks:1)

Vu-Topper RM

If velocity of a conductor moving through a magnetic field B is made zero then motional emf is:

-VBL

Question No:37

(Marks:1)

Vu-Topper RM

The lenz's law refers to:

Induced current

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Question No:38

(Marks:1)

Vu-Topper RM

The increase in capacitance of a capacitor due to presence of dielectric is due to:

Electric polarization

Question No:39

(Marks:1)

Vu-Topper RM

inductance L and a capacitance C has an oscillation frequency f . Two inductors, each with inductance L , and two capacitors, each with capacitance C , are all wired in series and the circuit is completed. The oscillation

F

Question No:40

(Marks:1)

Vu-Topper RM

Which of the following is equivalent to one coulomb?

One ampere second

Question No:41

(Marks:1)

Vu-Topper RM

Tesla is a unit of

Magnetic flux

Question No:42

(Marks:1)

Vu-Topper RM

The current in a car headlamp is 2.0 A. The headlamp is switched on for 3.0 minutes. How much charge passes through the headlamp?

360c

Question No:43

(Marks:1)

Vu-Topper RM

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

Undergoes some change when heated or cooled

Question No:44

(Marks:1)

Vu-Topper RM

A gas which strictly obeys the gas laws under all conditions of temperature and pressure is called:

Perfect gases

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Question No:45

(Marks:1)

Vu-Topper RM

In RL series circuit phase angle is given by:

Tan-1($\omega L/R$)

Question No:46

(Marks:1)

Vu-Topper RM

Which of the following have the greatest wavelength?

Radio waves

Question No:47

(Marks:1)

Vu-Topper RM

When a charge is projected perpendicular to a uniform magnetic field, its path is:

A circular path

Question No:48

(Marks:1)

Vu-Topper RM

When two objects come to common temperature, the body is said to be in:

Thermal equilibrium

Question No:49

(Marks:1)

Vu-Topper RM

Which method(s) of heat transfer can take place in vacuum?

Electromagnetic waves

Question No:50

(Marks:1)

Vu-Topper RM

A step-down transformer is used to:

Decrease the voltage

Question No:51

(Marks:1)

Vu-Topper RM

In an adiabatic process:

The work done by the environment on the system equals the change in internal energy.

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Question No:52

(Marks:1)

Vu-Topper RM

The focal length of a spherical mirror is N times its radius of curvature where N is:

$F=R/2$

Question No:53

(Marks:1)

Vu-Topper RM

Capacitive reactance X_c is:

$1/2 \pi f c$

Question No:54

(Marks:1)

Vu-Topper RM

Force per unit charge is:

Electric field.

Question No:55

(Marks:1)

Vu-Topper RM

If the kinetic energy of a free particle is much less than its rest energy then its kinetic energy is proportional to:

The square of the magnitude of its momentum

Question No:56

(Marks:1)

Vu-Topper RM

Which physical quantity is produced by a calculation where a charge is multiplied by a potential difference (p.d)?

Energy

Question No:57

(Marks:1)

Vu-Topper RM

Work done on a charged particle moving in uniform magnetic field is:

Zero

Question No:58

(Marks:1)

Vu-Topper RM

Which of the following is equivalent to 1 V?

$1 \text{ Joule}/1 \text{ coulomb} = 1 \text{ J/C}$

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Question No:59

(Marks:1)

Vu-Topper RM

If I_0 is the peak value of an AC supply, then its rms value is given as I_{rms} ?

$I_0/\text{square root } 2$

Question No:60

(Marks:1)

Vu-Topper RM

Heat has the same units as:

Work

Question No:61

(Marks:1)

Vu-Topper RM

Which of the following types of electromagnetic radiation at the vacuum?

(Radio, gamma, x) rays All of these travel at the same speed

Question No:62

(Marks:1)

Vu-Topper RM

Inductive reactance X_L of an inductor is π

$2(\pi) f L$

Question No:63

(Marks:1)

Vu-Topper RM

The sum of electric and magnetic force is called

Lorentz force

Question No:64

(Marks:1)

Vu-Topper RM

Kirchhoff's 2nd rule is the manifestation of the law of conservation of

Energy

Question No:65

(Marks:1)

Vu-Topper RM

The total energy in an circuit is $5.0 \times 10^{-6} \text{ J}$. if $L=25\text{mH}$ the maximum current is:

20mA

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Question No:66

(Marks:1)

Vu-Topper RM

The potential difference between the ends of a conductor is 12V. How much electrical energy is converted to other forms of energy in the conductor when 100C of charge flows through it?

1200J

Question No:67

(Marks:1)

Vu-Topper RM

The Focal length of convex lens is:

Positive

Question No:68

(Marks:1)

Vu-Topper RM

The AC circuit in which current and voltage are in phase the power factor is

1

Question No:69

(Marks:1)

Vu-Topper RM

The known laws of electromagnetism before James Clerk Maxwell were following EXCEPT

Faraday's Law

Question No:70

(Marks:1)

Vu-Topper RM

When some dielectric is inserted between the plates of a capacitor, then capacitance;

Increased

Question No:71

(Marks:1)

Vu-Topper RM

Which of the following is NOT the characteristics of electromagnetic waves?

They can travel with different speeds in vacuum depending on 0.4m

Question No:72

(Marks:1)

Vu-Topper RM

The quantity of $\Delta V / \Delta r$ is called

Potential gradient

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Question No:73

(Marks:1)

Vu-Topper RM

Which electromagnetic radiation transmits the highest photon energy?

Gamma rays

Question No:74

(Marks:1)

Vu-Topper RM

The reaction of an particle at 50 Hz is 10.0 its reactance at 100Hz becomes

5.0

Question No:75

(Marks:1)

Vu-Topper RM

Select the correct statement

Gamma Rays have higher frequency than infrared waves

Question No:76

(Marks:1)

Vu-Topper RM

Potentiometer can be used as

Potential divider

Question No:77

(Marks:1)

Vu-Topper RM

All of the followings are the different types of mental images; people generally experience them while close their eyes Except:

Solving an algebra equations

Question No:78

(Marks:1)

Vu-Topper RM

The nation that motivational state of the organism is understood and explained in terms of positive and negative environmental stimuli BEST connects to;

Incentive approaches

Question No:79

(Marks:1)

Vu-Topper RM

If one wants to increase the capacity of short-term memory, through which process more items can be held?

Chunking

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Question No:80

(Marks:1)

Vu-Topper RM

If potential difference across two plates of a capacitor is doubled, then

Four times

Question No:81

(Marks:1)

Vu-Topper RM

How could the unit of potential difference the volt also be written?

J/C

Question No:82

(Marks:1)

Vu-Topper RM

If magnetic field is doubled then magnetic energy density becomes

Four times

Question No:83

(Marks:1)

Vu-Topper RM

The primary of a 3.1 step-up transformer is connected to a source and the secondary this situation is P. If R is connected directly to the source it will dissipate a power of:

P/9

Question No:84

(Marks:1)

Vu-Topper RM

A particle having $2e$ charge falls through a potential difference of 5.V energy acquired by it is

10 eV

Question No:85

(Marks:1)

Vu-Topper RM

The combined effect of resistance and reactance is known as

Impedance

Question No:86

(Marks:1)

Vu-Topper RM

A transparent refracting medium bounded by the two curved surfaces called

Prism

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Question No:87

(Marks:1)

Vu-Topper RM

A student rubs a rod held in his hand. Which action causes the rod to gain a large electrostatic charge

Rubbing a polythene rod with a woolen duster

Question No:88

(Marks:1)

Vu-Topper RM

A charge of 30 C flows through an electric appliance in 2.0 minutes. What is the average current in the appliance?

0.25A

Question No:89

(Marks:1)

Vu-Topper RM

Total flux through a closed surface depends on

Charge and -N

Question No:90

(Marks:1)

Vu-Topper RM

Electromagnetic waves emitted from antenna are

Transverse

Question No:91

(Marks:1)

Vu-Topper RM

Two parallel straight wires carrying current in same direction will.

Attract each other

Question No:92

(Marks:1)

Vu-Topper RM

Charge carriers in electrolysis are:

Positive and negative ions

Question No:93

(Marks:1)

Vu-Topper RM

A detector is used to detect the speed at a particular wave if the frequency of an electromagnetic signal is 400 MHz, the speed define the detector is

300000 km/s

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Question No:94

(Marks:1)

Vu-Topper RM

The product of resistance and capacitance is called

Time

Question No:95

(Marks:1)

Vu-Topper RM

Greenhouse gases absorb ____ radiation

Infrared

Question No:96

(Marks:1)

Vu-Topper RM

Electromagnetic waves do not transport

Charge

Question No:97

(Marks:1)

Vu-Topper RM

Electric energy is measured :

Watt

Question No:98

(Marks:1)

Vu-Topper RM

Of the following which might NOT vanish over one cycle of a cyclic process?

The work done by the substance

Question No:99

(Marks:1)

Vu-Topper RM

The most refined form of matter is:

Light

Question No:100

(Marks:1)

Vu-Topper RM

In Compton scattering from stationary particles the maximum change in wavelength can be made smaller by using.

More massive particles

Question No:101

(Marks:1)

Vu-Topper RM

Hotness or coldness of an object is represented in terms of:

Temperature

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Question No:102

(Marks:1)

Vu-Topper RM

The unit of thermal conductivity might be:

Cal/(cm*s*C?)

Question No:103

(Marks:1)

Vu-Topper RM

It is more difficult to measure the coefficient of volume expansion of a liquid than that of a solid because?

The containing vessel also expands

Question No:104

(Marks:1)

Vu-Topper RM

When we accelerate the charge, which types of waves are produced?

Electromagnetic waves

Question No:105

(Marks:1)

Vu-Topper RM

Due to relative motion of observer and the frames of reference of events, time always:

Slows itself

Question No:106

(Marks:1)

Vu-Topper RM

The allowed energy states of atoms or molecules can be described by a set of _____.

Quantum numbers

Question No:107

(Marks:1)

Vu-Topper RM

Probability values are assigned on a scale of

0 to 1

Question No:108

(Marks:1)

Vu-Topper RM

The magnitude of the momentum of a particle can never exceed:

E/c , where E is its total energy

Question No:109

(Marks:1)

Vu-Topper RM

The ratio of the size of image to the size of object.

Angular magnification

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Question No:110

(Marks:1)

Vu-Topper RM

When white light passes through a prism, it splits into _____ colors.

7

Question No:111

(Marks:1)

Vu-Topper RM

A heat of transformation of a substance is:

The energy per unit mass absorbed as heat during a phase transformation

Question No:112

(Marks:1)

Vu-Topper RM

If electric and gravitational force on an electron in a uniform electric field balance each other, then the intensity of electric field will be:

Mg/q

Question No:113

(Marks:1)

Vu-Topper RM

During a slow adiabatic expansion of a gas No energy enters or leaves as heat

52

Question No:114

(Marks:1)

Vu-Topper RM

The electron states that constitute a single shell for an atom all have:

The same value of n

Question No:115

(Marks:1)

Vu-Topper RM

An isothermal process for an ideal gas is represented on a p-V diagram by:

A portion of a hyperbola

Question No:116

(Marks:1)

Vu-Topper RM

The concept of an electric field lines is introduced by:

Faraday

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Question No:117

(Marks:1)

Vu-Topper RM

The pauli exclusion principle is obeyed by:

All particles with spin quantum numbers of $\frac{1}{2}$

Question No:118

(Marks:1)

Vu-Topper RM

An electron ($m=9.11 \times 10^{-31}\text{kg}$) has a speed of $0.95c$. its kinetic energy is;

$1.8 \times 10^{-31}\text{J}$

Question No:119

(Marks:1)

Vu-Topper RM

An electron ($m=9.11 \times 10^{-31}\text{kg}$) has a momentum of $4.0 \times 10^{-22}\text{kg}\cdot\text{m/s}$. Its kinetic energy:

$6.3 \times 10^{-14}\text{J}$

Question No:120

(Marks:1)

Vu-Topper RM

Force on a charged particle is zero when projected at angle with the magnetic field

0 degree

Question No:121

(Marks:1)

Vu-Topper RM

In case of metallic conductors, the charge carriers are.

Electrons

Question No:122

(Marks:1)

Vu-Topper RM

As compared to distance measured by an observer on Earth, the distance from earth star measured by an observer in a moving spaceship would seem:

Same

Question No:123

(Marks:1)

Vu-Topper RM

Evidence that a gas consists mostly of empty space is the fact that The density of a gas becomes much greater when it is

Liquefied

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Question No:124

(Marks:1)

Vu-Topper RM

For an electron, the rest mass energy is:

0.511 MeV

Question No:125

(Marks:1)

Vu-Topper RM

Antiparticle of electron is:

Positron

Question No:126

(Marks:1)

Vu-Topper RM

According to the first law of thermodynamics, applied to a gas, the increase in the internal energy during any process

Equals the heat input plus the work done on the gas

Question No:127

(Marks:1)

Vu-Topper RM

The approach to personality stresses that people possess a basic goodness, and have a natural tendency to grow to higher levels of functioning is.

Humanistic

Question No:128

(Marks:1)

Vu-Topper RM

In a photoelectric experiment at a frequency above cut off, the stopping potential is proportional to :

The energy of the most energetic electron after it is ejected

Question No:129

(Marks:1)

Vu-Topper RM

There is a temperature at which the reading on the kelvin scale is numerically:

Equal to that on the Celsius scale

Question No:130

(Marks:1)

Vu-Topper RM

When you stand in front of a plane mirror, your image is:

Virtual, erect and the same size as you

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Question No:131

(Marks:1)

Vu-Topper RM

The process for which entropy remains constant is:

A reversible process

Question No:132

(Marks:1)

Vu-Topper RM

The appearance of colors in thin film is due to:

Interference

Question No:133

(Marks:1)

Vu-Topper RM

The theoretical upper limit for the frequency of electromagnetic waves is:

There is no upper limit

Question No:134

(Marks:1)

Vu-Topper RM

Capacitance of a capacitor in vacuum is given by:

$\epsilon_0 A/d$

Question No:135

(Marks:1)

Vu-Topper RM

An electron in a K shell of an atom has the principal quantum number:

$n=1$

Question No:136

(Marks:1)

Vu-Topper RM

Bending of light around the edges of an obstacle called:

Diffraction

Question No:137

(Marks:1)

Vu-Topper RM

Interface of light is evidence that:

Light is a wave phenomenon

Question No:138

(Marks:1)

Vu-Topper RM

In a photoelectric effect experiment at a frequency above cut off the number of electrons ejected is proportional to:

The number of photons that hit the sample

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Question No:139

(Marks:1)

Vu-Topper RM

In a photoelectric effect experiment the stopping potential is:

The electric potential that causes the electron current to vanish

Question No:140

(Marks:1)

Vu-Topper RM

A free electron and a free proton have the same kinetic energy. This means that, compared to the matter wave associated with the proton, the matter wave associated with the electron has:

A longer wavelength and the same frequency

Question No:141

(Marks:1)

Vu-Topper RM

Polarization experiments provide evidence that light is:

A transverse wave

Question No:142

(Marks:1)

Vu-Topper RM

If light of low wavelength is used in Young's double slit experiment, then width of the fringe will:

Decreases

Question No:143

(Marks:1)

Vu-Topper RM

Lenz's law is in accordance with law of conservation of

Energy

Question No:144

(Marks:1)

Vu-Topper RM

According to relativistic theory a particle of mass m with a momentum of $2mc$ has a speed of:

$c/2$

Question No:145

(Marks:1)

Vu-Topper RM

The two metallic strips that constitute some thermostats must differ in:

Coefficient of linear expansion

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Question No:146

(Marks:1)

Vu-Topper RM

Phase difference between V and I of an AC through resistor is:

0 degree

Question No:147

(Marks:1)

Vu-Topper RM

Average value of current and voltage over complete cycle is:

Zero

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Phy101 Searching file

by Orange Monkey Team

1. According to the equation of work, when a boy sits in one place and studies for the whole night, he does

No work

2. When the velocity of an aeroplane is doubled, the momentum_____

Increase uniformly

3. The momentum of an object at a given instant is independent of its.

Acceleration

4. What sort of energy does flying bird possess?

Both potential and kinetic energy

5. The acceleration of projectile in x-direction:

0ms^{-2}

6. The projectile path is also known as its

Trajectory

7. If force of friction is negligible, then acceleration of two freely falling objects of different masses is:

Smaller acceleration for smaller mass

8. Which of the following statement/s is/ are true?

- The weight of a man on the moon is smaller than that on the earth
- The mass of a man is the same on both the moon and the earth
- We cannot determine our own mass in the outer space because there is no gravity

1 only

9. When the momentum of a body is doubled, its kinetic energy_____

Becomes four times its initial energy

10. Which of the following statement is true

Gravity is necessary to measure both weight and mass

11. It is easier to walk on the concrete road than on ice because

the friction between the ice and the feet is less than that between the concrete and feet

12. Pre-second refers to the dimensions of physical quantity

_____ Velocity

13. If the mass of moving objects is doubled then its K.E becomes

4 times

14. The slope of a velocity-time the graph at any point may be identified with

Average acceleration

15. K.E can be defined as the dot product of

Mass and velocity

16. A wheel of radius 50cm having the angular speed of 5 rad/s will have linear speed in m/s

2.5

19. Lighter objects always reach the ground later than heavier objects

2 and 3 only

17. In _____ object returns to its original position if displaced slightly

Stable equilibrium

18. Newton first law is also called _____

Law of inertia

19. A mosquito's buzz is often rated with a decibel rating of 40 db _

20

20. The product of force and time is called change in _____

Momentum or impulse.... Both are correct

21. People try to keep the _____ over their feet in order to feel stable

Center of gravity

22. If the magnitude of force applied is incorrect the work done will _____ be increased unit of distance is

Light year

23. Power is equal to the dot product of force and Velocity

24. Product of vector $\mathbf{a}$ with itself is equal to

$$A^2$$

25. For a body to be in equilibrium under the combined action of several forces

The sum of the torques about any point must equal zero

26. The ratio of circumference of a circle to its diameter is equal to

π

27. A net torque applied to a rigid object always tends to produce

Angular acceleration

28. The work done by gravity during the descent of a projectile

Is positive

29. A man with his arms at his sides is spinning on a low friction stool

His angular momentum remains the same

30. Example of physical quantity is

Length

31. Swimming becomes possible because of

Third law of motion

32. The scalar product of two vectors is maximum when they are

Parallel

33. Which of the following statements are true of sound waves _____
identify all that apply

A sound wave is a mechanical wave

34. The angular momentum vector of earth about its rotation axis. Due to its daily rotation is directed

north

35. For an object in equilibrium the net torque acting on it vanishes only if each torque is calculated about

the same point

36. People try to keep the _____ over their feet in order to feel stable

Centre of gravity

37. Add two vectors of length 4m & 5m but their orientation is not known____the length after addition

Between 9m and 1 m

38. Which statement is not true for acceleration?

riding your bike straight down the street at a constant speed

39. Acceleration of an object must be zero at a point where

The instantaneous velocity is constant

40. Which of the following statements are true of sound waves____identify that apply

A sound wave is mechanical wave

41. If the distance between all pairs of particles of the body do not change by applying a force then the body is said to be

Rigid

42. A couple produces

Purely rotation motion

43. To determine if a rigid body is equilibrium the vector sum of the gravitational forces acting on the particles of the body can be replaced by a single force acting at

The center of gravity

44. Work may be done by

Only living organisms

45. The dimension of joule is

ML^2T^{-2}

46. The unit $kg\ m^2/s$ can be used for

Angular momentum

47. Unit of distance is

Meter

48. The law of inertia was firstly formulated by

Galileo

49. What is the angle of projection of projectile for which its maximum height and horizontal range are equal

90

50. A body will be in translational equilibrium if

$\Sigma F = 0$

51. Suitable units for the gravitational constant G are

$\text{m}^3/\text{kg s}^2$

54. As the wavelength of a wave in a uniform medium increases its frequency will

Remains the same

52. A sound wave is a mechanical wave not an electromagnetic wave this means that

A medium is required in order for sound waves to transport energy

53. The gravitational constant G has the derived units

Nm^2/kg^2

54. If the formula $F = Gm_1m_2/r^2$ the quantity G

Is a universal constant of nature

55. An object moving in a circle at constant speed

Has an acceleration of constant magnitude

56. The fundamental dimension of angular momentum are

$\text{ML}^2\text{T}^{-2} \text{Kg m}^2/\text{s}$

57. The area under the velocity time graph is

Distance

58. A particle oscillating in simple harmonic motion is

In equilibrium at the ends of its path because the acceleration is zero there

59. An elastic collision is one in which

K.E and momentum are both conserved

65. When brakes are applied to a fast moving car the passenger will be thrown

Forward

60. Work has dimension like power

Power

61. A 1kg block is lifted vertically 1m by a boy. The work done by the boy is about.

1J

62. 0.0003711 in scientific notation is

3.7×10^{-4}

68. A bullet shoot straight up returns to its starting point in 10 sec. the initial speed was

49m/s

63. The rate of change of momentum of a body is equal to

Applied force

64. If you travelled for 2.5 hours with an average speed 48 miles/hours. The distance travelled is

120 miles

65. A stone is thrown up from the surface of earth, then it reaches a maximum height, kinetic energy is equal to:

Zero

66. A force of 100N acts upon a body for 5 seconds. What will be the change in momentum?

500Ns

67. The relative speed of approach is always equal to relative speed of separation in?

Perfectly elastic collision

68. If the magnitude of force applied is increased, the work done will ?

Be increased

69. 6 joule of work done in 3 second then power is?

2 watt

70. An object moving in the circle at constant speed.

Must have only one force acting on it

71. A vector a is added to vector b. the resultant vector(a+b) have greatest magnitude when:

When vector A and B are perpendicular

72. A force of 120 newton is exerted on a 40 kg container which sits on a floor. If the friction force between floor and container is 80 Newton. What is the magnitude of acceleration of container?

2ms^{-2}

73. The angle between rectangular components of a vector is

45 degree

74. Newton second law of motion is also called ?

Law of acceleration

75. The goal of all scientific enquiry or scientific method is?

Predicting natural events based on known patterns

76. If the total momentum of a system is changing

A net external force must be acting on the system

77. Change in momentum in one second is called?

Impulse

78. A/An _____ is the basic reason to change the motion of an object according to Newton's second law of motion.

Net force

79. An object moves in a circle at constant speed. The work done by centripetal force is zero because_?

The centripetal force is perpendicular to the velocity

80. The law of conservation of momentum applies to a system of colliding object only if

The net external impulse is zero

81. Force is a

Universal quantity

82. When the mass of the colliding body is much larger than the mass of the body at rest, its velocity after collision

Become double

83. The slope of a velocity – time the graph at any point may be identified with

Average acceleration

84. If the force acting on a body is doubled then the acceleration becomes

Double

85. Force:

Equal the time rate of change of momentum

86. When a spring is compressed or stretched, the potential energy of the spring

Increases

87. Which of the following statement is true

Weight is a force, mass is a measure of inertia

88. A ball is allowed to fall freely from certain height. It covers a distance in 1st second equal to

$2g$

89. Acceleration of an object must be zero at a point where:

The average velocity is zero

90. A body is changing its direction but its speed is constant, the object is:

Accelerating

91. Per-second refers to the dimension of physical quantity

Velocity

92. The scalar product of two vectors is maximum when they are

Parallel

93. Physics is one of the branches of

Physical sciences

94. Suppose no reaction force exists then which of the following case\ s will occur?

- **We cannot swim**
- **We cannot jump**
- **We cannot walk**

1 2 and 3 all

95. Newton-Second is SI unit of:

Impulse

96. Work done in gravitational field

Negative

97. When body moves with constant acceleration the velocity time graph is:

Straight line

1. A sound wave has a wavelength of 3.0m. The distance from a compression center to the adjacent rarefaction center is:

1. 0.75m
2. 1.5m
3. 3.0m
4. need to know wave speed

2. The speed of sound in medium depends upon

1. amplitude
2. frequency
3. wavelength
4. properties of the medium

3. Which of the following will remain unchanged when a sound wave travels in air or in water?

1. Amplitude
2. Wavelength
3. Frequency
4. Speed

4. The vibrations or the pressure variations inside the inner ear are converted into electrical signals by the _____.

1. cochlea
2. tympanic membrane
3. pinna
4. anvil

5. Sound and light waves both

1. have similar wavelength
2. obey the laws of reflection
3. travel as longitudinal waves
4. travel through vacuum

6. A mosquito's buzz is often rated with a decibel rating of 40 dB. Normal conversation is often rated at 60 dB. How many times more intense is normal conversation compared to a mosquito's buzz?

1. 2
2. 20
3. 100
4. 400

7. Point where force causes system to move without rotation is

1. 2 times beyond centre of mass
2. edge of the body
3. mid point of body
4. center of mass

8. The frequency which is not audible to the human ear is

1. 50 Hz
2. 500 Hz
3. 5000 Hz
4. 50000 Hz

9. If the speed of sound is 340 m/s a plane flying at 400m/s creates a conical shock wave with an apex half angle of:

1. 0 (no shock wave)
2. 32°
3. 40°
4. 58°

10. A municipal water supply is provided by a tall water tower. Water from this tower flows to a building. How does the water flow out of a faucet on the ground floor of a building compare with the water flow out of an identical faucet on the second floor of the building?

1. Water flows more rapidly out of the ground-floor faucet.
2. Water flows more rapidly out of the second-floor faucet.
3. Water flows at the same speed out of both faucets.
4. The speed of water flow cannot be determined unless the height of the water tower is known.

11. A sound wave has a wavelength of 3.0m. The distance from a compression center to the adjacent to the rarefaction center is:

1. 0.75m
2. 1.5m
3. 3.0m
4. need to know frequency

12. A plane produces a sonic boom only when:

1. it emits sound waves of very long wavelength
2. it emits sound waves of high frequency it flies at high altitudes
3. it flies faster than the speed of sound
4. it flies faster than the speed of sound

13. acceleration of an object must be zero at a point where:

1. the instantaneous velocity is zero but changing
2. the instantaneous velocity is constant
3. the average velocity is zero
4. the instantaneous velocity is not zero but changing

14. Coulomb's law is only true for point charges whose sizes are

1. large
2. very small
3. very large
4. medium

15. A vector A is added to a vector B. The resultant vector A + B have greatest magnitude when:

1. The magnitude of vector A + B does not depend on the directions of A and B
2. When vectors A and B are parallel and in the opposite direction
3. When vectors A and B are parallel and in the same direction
4. When vectors A and B are perpendicular

16. Earth exerts a gravitational force on the Moon, keeping it in its orbit. The reaction to this force, in the sense of Newton's third law, is:

1. the centripetal force on the Moon
2. the nearly circular orbit on the Moon
3. the gravitational force on Earth by the Moon
4. the tides due to the Moon

17. The angular momentum vector of Earth about its rotation axis, due to its daily rotation, is directed:

1. south
2. north
3. tangent to the equator toward the west
4. tangent to the equator toward the east

18. Work may be done by _____.

1. only vehicles
2. only non-living objects
3. only living organisms
4. both living organisms and non-living objects

19. In simple harmonic motion, the restoring force must be proportional to the:

1. amplitude
2. frequency
3. velocity
4. displacement

20. The turning effect of a force is called the force's

1. momentum
2. torque/moment
3. distance
4. inertia

21. How much pressure is exerted on a submarine at a depth of 8.50 km in the Pacific Ocean? (The density of sea water = $1.025 \times 10^3 \text{ kg/m}^3$, and the atmospheric pressure at sea level = $1.01 \times 10^5 \text{ Pa}$.)

1. $8.6 \times 10^5 \text{ Pa}$
2. $8.7 \times 10^6 \text{ Pa}$
3. $9.5 \times 10^6 \text{ Pa}$

4. $8.6 \times 10^6 \text{ Pa}$

22. A 4.0-m long steel beam with a cross-sectional area of $1.0 \times 10^{-2} \text{ m}^2$ and a Young's modulus of $2.0 \times 10^{11} \text{ N/m}^2$ is wedged horizontally between two vertical walls. In order to wedge the beam, it is compressed by 0.020mm. If the coefficient of static friction between the beam and the walls is 0.70 the maximum mass (including its own) it can bear without slipping is:

1. 3.6 kg
2. 36 kg
3. 71 kg
4. 710 kg

23. The torque about any two points has the same value when the body is in

1. translational equilibrium
2. neutral equilibrium
3. dynamic equilibrium
4. static equilibrium

24. The work done by gravity during the descent of a projectile:

1. depends for its sign on the direction of the y axis
2. is positive
3. is negative
4. is zero

25. Take the speed of sound to be 340m/s. A thunder clap is heard about 3 s after the lightning is seen. The source of both light and sound is:

1. moving overhead faster than the speed of sound
2. emitting a much higher frequency than is heard
3. emitting a much lower frequency than is heard
4. about 1000m away

26. The magnitude of the acceleration of a planet in orbit around the Sun is proportional to:

1. the mass of the planet
2. the mass of the Sun
3. the distance between the planet and the Sun

4. the reciprocal of the distance between the planet and the Sun

27. The unit $\text{kg}\cdot\text{m}^2/\text{s}$ can be used for:

1. angular momentum
2. rational kinetic energy
3. rational inertia
4. torque

28. Which of the following statements about floating object is correct?

1. The object's density is greater than the density of the fluid on which it floats.
2. The object's density is equal to the density of the fluid on which it floats.
3. The displaced volume of fluid is greater than the volume of the object.
4. The buoyant force equals the object's weight.

29. When a spring is compressed or stretched, the potential energy of the spring

1. Decreases
2. stays constant
3. Increases
4. Becomes zero

30. An ultrasonic wave is sent from a ship towards the bottom of the sea. It is found that the time interval between the sending and receiving of the wave is 1.6 s. What is the depth of the sea, if the velocity of sound in the seawater is 1400 m/s ?

1. 1120 m
2. 560 m
3. 1400 m
4. 112 m

31. To determine if a rigid body is in equilibrium the vector sum of the gravitational forces acting on the particles of the body can be replaced by a single force acting at:

1. a point on the boundary

2. the center of gravity
3. the geometrical center
4. the center of mass

32. A couple produces:

1. Purely linear motion
2. Purely rotational motion
3. Linear and rotational motion
4. No motion

33. In _____ object returns to its original position if displaced slightly

1. dynamic equilibrium
2. stable equilibrium
3. unstable equilibrium
4. rotational equilibrium

34. The momentum of an object at a given instant is independent of its:

1. acceleration
2. velocity
3. speed
4. mass

35. A vector is obtained by dividing the vector by its magnitude:

1. unit
2. position
3. normal
4. negative

36. According to the equation of work, when a boy sits in one place and studies for the whole night, he does

1. lot of work
2. no work
3. too much work
4. very little work

37. The application/s of dimensional analysis is/are:

- i. To convert a physical quantity from one system of units to another.

- ii. To check the dimensional correctness of a given equation.
iii. Establish a relationship between different physical quantities in an equation.

1. i only
2. ii & iii only
3. i & iii only
4. I, ii & iii

38. The angle between rectangular components of a vector is:

1. 0°
2. 45°
3. 60°
4. 90°

39. A qualitative definition of force is given by which law?

1. law of inertia

40. Which pair will always have the same magnitude to the rate of change of position?

1. Average speed and average velocity

41. Add two vectors of length 4 m & 5 m but their orientation is not known, The length after addition of these two vectors will be:

1. Less than 1 m
2. between 9 m and 1 m
3. between 9 m and 5 m
4. 9m

42. What is the angle of projection of projectile, for which its maximum height and horizontal range are equal?

1. 30°

2. 36*

3. 76*

4. 90*

43. A unit vector is obtained by dividing the vector by its magnitude:

1. unit

2. position

3. normal

4. negative

44. When the momentum of a body is doubled, its kinetic energy _____.

1. Becomes ten times its kinetic energy

2. Becomes four times its initial kinetic energy

45. A ball is thrown upward into air with a speed that is greater than terminal speed. It lands at the place where it was thrown. During its flight the force of air resistance is the greatest:

1. just after it is thrown

2. half way up

3. at the top of its trajectory

4. halfway down

46. An object moves in a circle at constant speed. The work done by the centripetal force is zero because:

1. the displacement for each revolution is zero

2. the average force for each revolution is zero

3. there is no friction

4. the centripetal force is perpendicular to the velocity

47. It is easier to walk on concrete road than on ice because:

1. the amount of firection is same for both (ice & concrete road)
2. there is more friction on the ice than on concrete
3. ice is soft and spongy where as concrete is hard
4. the friction between the ice and the feet is less than that between the concrete and feet

48. An inellastic collidion is one in which:

1. momentum is not conserved but kinetic energy is conserved
2. total mass is not conserved but momentum is conserved
3. neither kinetic energy nor momentum is conserved
4. momentum is conserved but kinetic energy is not conserved

49. When you step on the accelerator to increase the speed of your car, the force that accelerates the car is

1. the force of friction of the road on the tires

50. Light year is a unit of:

1. accelration
2. velocity
3. time
4. distance

51. A body is changing its direction but speed is constant, the object is:

1. accelerating
2. slowing down
3. speeding
4. Displacing

52. The ratio of circumference of a circle to its diameter is equal to:

1. 2π
2. π
3. $\pi/2$
4. one steradian

53. Which of the following statements are TRUE of sound waves? Identify all that apply.

1. Sound can travel through a vacuum
2. A sound wave is a transverse wave
3. A sound wave is a mechanical wave
4. To hear the sound of a tuning fork, the tines of the fork must move air from the fork to one's ear

54. A force of 120 N is exerted on a 40 kg container which sits on a floor. If the frictional force between floor and container is 80 N. What is the magnitude of the acceleration of the container?

1. 2 ms^{-2}
2. 5 ms^{-2}
3. 3 ms^{-2}
4. 1 ms^{-2}

55. If a simple pendulum oscillates with an amplitude 50 mm and time period 2s, then its maximum velocity is

1. 0.1 m/s
2. 0.15 m/s
3. 0.8 m/s
4. 0.16 m/s

56. Acceleration in a body is always produced in the direction of:

1. Velocity
2. Weight
3. Force
4. Acceleration

57. The center of mass of a uniform disk of radius R is located:

1. at the center
2. a distance $R/3$ from the center
3. a distance $R/2$ from the center

4. on the rim

58. For a body to be in equilibrium under the combined action of several forces:

1. any two of these forces must be balanced by a third force
2. the sum of components of all the forces in any direction must equal zero
3. all of the forces form pairs of equal and opposite forces
4. all the forces must be applied at the same point

59. A source of frequency of 500 Hz emits waves of wavelength 0.4 m, how long does the wave take to travel 600 m?

1. 3 s

60. Momentum may be expressed in:

1. kg/(m s)
2. N s
3. gram s
4. kg/m

61. A force of 5000N is applied outwardly to each end of a 5.0-m long rod with a radius of 34.0 cm and a Young's modulus of $125 \times 10^8 \text{ N/m}^2$. The elongation of the rod is:

1. 0.0020mm
2. 0.0040mm
3. 0.14mm
4. 0.55mm

62. The speed of a sound wave is determined by:

1. its amplitude

2. its intensity
3. the transmitting medium
4. number of harmonics present

63. Which of the following statement is TRUE of sound intensity and decibel levels? Identify all that apply.

1. The intensity of sound which corresponds to the threshold of pain is one trillion times more intense than the sound which corresponds to the threshold of hearing.
2. Two sounds which have a ratio of decibel ratings equal to 2.0. This means that the second sound is twice as intense as the first sound.
3. Sound A is 20 times more intense than the sound B. So if sound B is rated at 30 dB, then sound A is rated at 50 dB.
4. A machine produces a sound which is rated at 60 dB. If two of the machines were used at the same time, the decibel rating would be 120 dB.

64. Sound waves are

1. longitudinal

65. For an ideal fluid flowing through a horizontal pipe, Bernoulli's equation states that the sum of the pressure and energy per unit volume along the pipe does which of the following? (Assume measurements are taken along the pipe in the direction of fluid flow.)

1. increases as the pipe diameter increases
2. decreases as the pipe diameter increases
3. remains constant as the pipe diameter increases
4. increases, then decreases as the pipe diameter increases

66. A 2.0-kg block travels around a 0.5-m radius circle with an angular velocity of 12 rad/s. Its angular momentum about the center of the circle is:

1. 6.0 kg.m²/s
2. 12 kg.m²/s
3. 48 kg/m².s
4. 72 kg.m²/s²

67. The fundamental dimensions of angular momentum are

1. $\underline{ML^{-2}T^{-2}}$
2. $\underline{MLT^{-1}}$
3. $\underline{ML^2T^{-1}}$
4. $\underline{ML^2T^{-2}}$

12. Power is equal to the dot product of force and:

c) Velocity

2) The frequency which is not audible to the human ear is

Select the correct option

a) 50000 Hz

b) 500 Hz

c) 5000 Hz

d) 50 Hz

3) A wheel of radius 50 cm having the angular speed of 5 rad/s will have linear speed in m/s?

Select the correct option

a) 1.5

b) 2.5

c) 3.5

d) 0.5

4) When breaks are applied to a fast-moving car, the passenger will be thrown:

Select the correct option

a) Backward

b) Forward

c) Upward

d) Downward

5) Stress can be measured in:

Select the correct option

a) N.m

b) N/m²

c) N.m²

d) N/m

6) A heavy particle moving with 5 m/s suffers an elastic collision with a light particle at rest. After collision, velocity of light particle will be:

Select the correct option

a) 10 m/s

b) 2.5 m/s

c) 20 m/s

d) 5 m/s

6) Acceleration in a body is always produced on the direction of:

Select the correct option

a) Velocity

b) Weight

c) Acceleration

d) Force

7) The fundamental dimensions of angular momentum are

Select the correct option

a) $ML^{-2}T^{-2}$

b) ML^2T^{-1}

c) ML^2T^{-2}

d) MLT^{-1}

8) Ali wants to lift a mass of 7.5 kg with constant velocity by a rope that passes through a frictionless pulley which is attached to the ceiling of room. Calculate the tension in the rope by neglecting the mass of the rope.

Select the correct option

a) 75 N

b) 7.5 Kg

c) 75 Kg

d) 0.75 N

9) The first condition of equilibrium implies that:

Select the correct option

a) $\sum F_y = 0$

b) $\sum F_x = \sum F_y$

c) $\sum F = 0$

d) $\sum F_x = 0$

10) Final take off velocity of an airplane is 67 m/s. The length of runway is 2 km, the constant acceleration is:

Select the correct option

a) 3.24 ms^{-1}

b) 3.24 ms^{-2}

c) 2.24 ms^{-1}

d) 2.24 ms^{-2}

11) The ultimate strength of a sample in the stress at which the sample:

Select the correct option

a) remain underwater

b) breaks

c) bends 180°

d) returns to its original shape when the stress is moved

12) The area under the velocity-time graphs is:

Select the correct option

a) Acceleration

b) Torque

c) Distance

d) Force

13) if you traveled for 2.5 hours with an average speed 48 miles/hours, the distance traveled is:

Select the correct option

a) 19.2 miles

b) 120 miles

c) 300 miles

d) 48 miles

14) The law of inertia was firstly formulated by:

Select the correct option

a) Newton

b) Einstein

c) Galileo

d) Aristotle

15) When the velocity of an aeroplane is doubled, the momentum ____.

Select the correct option

a) Is conserved

b) Becomes zero

c) Increase uniformly

d) Remains unchanged

16) As we move above, the body above the surface of the earth, the change in potential energy will be:

Select the correct option

a) Infinity

b) Positive

c) Zero

d) Negative

17) The slope of a velocity – time the graph at any point may be identified with:

Select the correct option

a) average acceleration

18) A body of mass 2 kg moving with velocity 4 m/s has K.E equals to:

Select the correct option

a) 16 J

b) 8 J

c) 32 J

d) 2 J

19) A ____ velocity is obtained by dividing the vector by its magnitude:

Select the correct option

a) negative

b) unit

c) position

d) normal

20) A particle oscillating in simple harmonic motion is:

Select the correct option

a) in equilibrium at the center of its path because the acceleration is zero there

b) never in equilibrium because it is in motion

c) in equilibrium at the end of its path because the acceleration is zero there

d) never in equilibrium because there is always a force

22) Young's modulus is a proportionality constant that relates the force per unit area applied perpendicularly at the surface of an object to:

Select the correct option

a) the fractional change in volume

b) the fractional change in length

c) the shear

d) the pressure

23) A bullet shoot straight up returns to its sharing point in 10 sec. the initial speed was:

Select the correct option

a) 49 m/s

b) 9.8 m/s

c) 98 m/s

d) 24.5 m/s

24) An object attached to one end of a spring makes 20 vibrations in 10 s. Its angular frequency is:

Select the correct option

a) 1.57 rad/s

b) 12.6 rad/s

c) 2.0 rad/s

d) 6.3 rad/s

25) The dimensional units of ratio of work and power is:

Select the correct option

a) F

b) J

c) T

d) L

26) The newton-second is a unit of:

Select the correct option

a) power

b) angular momentum

c) linear momentum

d) work

27) A sound wave has a wavelength of 3.0m. The distance from a compression center to the adjacent rarefaction center is:

Select the correct option

a) 3.0m

b) 1.5m

c) 0.75m

d) need to know wave speed

28) For an object in equilibrium the net torque acting on it vanishes only if each torque is calculated about:

Select the correct option

a) the center of gravity

b) the same point

c) the geometrical center

d) the center of mass

29) If a simple pendulum oscillates with an amplitude 50 mm and time period 2s, then its maximum velocity is

Select the correct option

a) 0.8 m/s

b) 0.16 m/s

c) 0.15 m/s

d) 0.1 m/s

30) bank and forth is a leftward and rightward direction. This type of wave is known as a ____.

Select the correct option

a) Mechanical

b) Electromagnetic

c) Transverse

d) Longitudinal

18) A/an ____ is the basic reason to change in the motion of an object according to Newton's second law of motion

Select the correct option

- a) acceleration
- b) change in velocity
- c) **net force**
- d) decrease in inertia

19) If the distance between all pairs of particles of the body do not change by applying a force, then a body is said to be

Select the correct option

- a) **rigid**
- b) small
- c) large
- d) flexible

20) The center of mass of Earth's atmosphere is:

Select the correct option

- a) near the outer boundary of the atmosphere
- b) **near the center of earth**
- c) a little less than halfway between earth's surface and the outer boundary of the atmosphere
- d) near the surface of earth

21) An object attached to one end of a spring makes 20 complete oscillations in 10 s. Its period is:

Select the correct option

- a) 0.5 s
- b) 0.5Hz
- c) **2 s**
- d) 2Hz

22) Whenever an object strikes a stationary object of equal mass:

Select the correct option

- a) the first object must stop
- b) the two objects cannot stick together
- c) **none of these**
- d) the collision must be elastic

23) If a wheel turns with constant angular speed then:

Select the correct option

- a) each point on its moves with constant velocity
- b) each point on its rim moves with constant acceleration
- c) the wheel turns through equal angles in equal times

d) the angle through which the wheel turns in each second increases as time goes on

24) A stone is thrown up from the surface of earth, the it reaches a maximum height, kinetic energy is equal to:

Select the correct option

- a) $\frac{1}{2} mv$
- b) mgh
- c) $2mgh$
- d) zero

25) In Simple harmonic motion, the magnitude of the acceleration is

Select the correct option

- a) greatest when the velocity is greatest
- b) proportional to the displacement
- c) inversely proportional to the displacement
- d) constant

The angle between rectangular components of a vector is:

Select the correct option

- a) 0°
- b) 45°
- c) 60°
- d) 90°

10) A ____ vector is obtained by dividing the vector by its magnitude

Select the correct option

- a) **unit**
- b) position
- c) normal
- d) negative

11) According to the equation of work, when a boy sits in one place and studies for the whole night, he does

Select the correct option

- a) lot of work
- b) **no work**
- c) too much work
- d) very little work

12) the projectile path is known as its:

Select the correct option

- a) range
- b) **trajectory**
- c) curve
- d) time of action

13) If force of friction is negligible, then acceleration of two freely falling objects of different masses is:

Select the correct option

- a) None of these
- b) **Smaller acceleration for smaller mass**
- c) Variable
- d) The same

14) Add two vectors of length 4 m & 5m but their orientation is not known. The length after addition of these two vectors will be:

Select the correct option

- a) **between 9 m and 1 m**
- b) 9 m
- c) between 9 m and 5
- d) Less than 1 m

15) The dimensional units of ratio of work and power is:

Select the correct option

- a) L
- b) F
- c) J
- d) **T**

16) A sphere of moment on inertia I rolls down an inclined plane without slipping. The ratio of the rotational kinetic energy to the transitional kinetic energy is nearly:

Select the correct option

- a) **5/7**
- b) 7/5
- c) 2/5

d) 5/2

17) Swimming becomes possible because of:

Select the correct option

- a) First law of motion
- b) Second law of motion
- c) **Third law of motion**
- d) Law of torque

An object moves in a circle at constant speed. The work done by the centripetal force is zero because:

- d) **the centripetal force is perpendicular to the velocity**

3) When the velocity of an aeroplane is doubled, the momentum ____.

Select the correct option

- a) **Increase uniformly**
- b) Becomes zero
- c) Is conserved
- d) Remains unchanged

4) The momentum of an object at a given instant is independent of its:

Select the correct option

- a) **acceleration**
- b) velocity
- c) speed

d) mass

5) What sort of energy does flying bird possess?

Select the correct option

- a) Potential energy
- b) Kinetic energy
- c) Elastic energy
- d) **Both potential and kinetic energy**

6) The acceleration of projectile in x-direction:

Select the correct option

- a) depends on initial velocity
- b) depends on how long it is in the air
- c) depends on y-acceleration
- d) **0 m/s²**

7) Light year is a unit of:

Select the correct option

- a) acceleration
- b) velocity
- c) time
- d) distance

8) The goal of all scientific inquiry (or scientific method) is:

Select the correct option

- a) world peace

b) predicting natural events based

c) to make everyone rich and happy

As the wavelength of a wave in a uniform medium increases, its frequency will _____.

Decrease

9

A bullet shot straight up returns to its starting point in 10 sec. the initial speed was:

49 m/s

11

Young's modulus is a proportionality constant that relates the force per unit area applied perpendicularly at the surface of an object to:

the fractional change in length

12

A ball is thrown upward into the air with a speed that is greater than terminal speed. It lands at the place where it was thrown. During its flight the force of air resistance is the greatest:

at the top of its trajectory

13

A sphere of the moment on inertia I roll down an inclined plane without slipping. The ratio of the rotational kinetic energy to the translational kinetic energy is near:

5/7

14

The persistence of audible sound due to the successive

Reverberation

	reflections from the surrounding objects even after the source has stopped to produce that sound is called	
15	A municipal water supply is provided by a tall water tower. Water from this tower flows to a building. How does the water flow out of a faucet on the ground floor of a building compare with the water flow out of an identical faucet on the second floor of the building?	Water flows more rapidly out of the ground-floor faucet.
16	An elastic collision is one in which:	kinetic energy and momentum are both conserved
17	The ultimate strength of a sample is the stress at which the sample	Breaks/ returns to its original shape when the stress is removed
18	The dot product of vector A with itself is equal to:	A^2
19	A heavy particle moving with 5 m/s suffers an elastic collision with a light particle at rest. After the collision, the velocity of light particle will be:	5 m/s
20	Young's modulus can be correctly given in:	N/m^2
21	A net torque applied to a rigid object always tends to produce:	angular acceleration
23	The velocity-time graph is parallel to the time axis the acceleration of moving body is:	zero
24	What is the angle of projection	76

	of projectile, for which its maximum height and horizontal range are equal?	
25	A particle	
26	The dimensional units of the ratio of work and power is:	T
27	The magnitude of the acceleration on the planet in orbit around the Sun is proportional to.	the mass of the Sun
28	A Prosonic wave I gent from @ ship towards the bottom of the sea. N is found that the time interval between the sending and receiving of the wave is 1.6 5. What is the depth of the sea. if the velocity of sound in the seawater is	1120m
29	Water flows into © house at e velocity of 15 m/s through a pipe that has 9 radii of 0.40 m. The water then flows through a smaller pipe at a velocity of 45 m/s. What is the radius of the smuttier pipe?	0.23m
30	A mosquito's buzz is often rated with a decibel rating of 40 dB. Normal conversation is often rated at 60 dB. How many times more intense is normal conversation compared to 6 mosquito's buzz?	20
31	People try to keep the... over their feet. in order to feel stable.	center of gravity
32	If force is applied at the center of mass then torque is.	Zero

33	As the wavelength of a wave in a uniform medium increases. its speed will	Decrease
34	For an ideal fluid flowing through a horizontal pipe, Bernoulli's equation state that the sum of the pressure and energy per unit volume along the pipe does which of the following?	Remains constant as the pipe diameter increases
35	Which of the following statement is true?	Weight is a force, mass is a measure of inertia
36	A/an ----- is the basic reason to change in the motion of an object according to Newton's second law of motion.	Net force
37	When spring is compressed or stretched, the potential energy of spring	Increase
38	The ultimate strength of a sample is the stress in which the sample:	Breaks
39	The value of k in coulomb's law depends upon:	Medium between two charges
40	The law of inertia was firstly formulated by	Newton
41	The ratio of the circumference of a circle to its diameter is equal to:	Pi
42	A water bed that is 1.5 m wide and 2.5 m long weighs 1055 N. assuming the entire lower surface of the bed in contact	280 pa

	with the floor, what is the pressure the bed exerts on the floor?	
43	The center of gravity is the average location of the of an object	Weight
44	Acceleration in a body is always produced in the direction of	Force
45	As per coulomb's law, the force of attraction or repulsion between two-point charge directly proportional to the	Product os the magnitude of charges
46	One revolution is the same as:	2pi rad
47	A ----- vector is obtained by dividing the vector by its magnitude:	Unit
48	Take the speed of the sound to be 340m/s. A thunderclap is heard about 3 s after the lightning is seen. The source of both light and sound is:	About 1000m away
49	The fundamental dimensions of angular momentum are :	ML ² T ⁻¹
50	The approximate value of get an altitude above Earth equal to one Earth diameter is:	4.9m/s ²
51	If the speed of sound is 340m/s a plane flying at 400m/s creates @ conical shock wave with an apex half-angle of:	Zero
52	If the distance between all pairs of particulars of the body do not change by applying a force that a body is said to be	Rigid

PHY101 quiz 3(2022)

1. Lenz's law is in accordance with law of conservation of

Energy...confirm

2. Which of the following types of electromagnetic radiation at the greatest speed in vacuum?

All of these travels at the same speed.....confirm

3. Inductive reactance X_L of an inductor is

a. $2(\pi)fL$ confirm

4. Force per unit charge is:

Electric field intensity...confirm

5. The sum of electric and magnetic force is called

Lorentz force...confirm

6. Radio waves and light waves are _____.

Electromagnetic and transverse both...confirm

7. Kirchhoff's 1st rule is the manifestation of the law of conservation of

Charge...confirm

8. Kirchhoff's 2nd rule is the manifestation of the law of conservation of

Energy...confirm

9. The total energy in an circuit is 5.0×10^{-6} J. if $L=25\text{mH}$ the maximum current is:

20mA...confirm

10. If I_0 is the peak value of an AC supply, then its rms value is given as firms

$I_0/\text{square root}2$ confirm

11. The potential difference between the ends of a conductor is 12V. How much electrical energy is converted to other forms of energy in the conductor when 100C of charge flows through it?

1200J....confirm

12. A particle carrying a charge of $2e$ falls through potential difference of $3V$ the energy acquired by it will be:

6 eV...confirm

13. An inductor may store energy in its:

Magnetic field...confirm

14. The graphical representation of Ohm's law is:

Straight line...confirm

15. Radio waves and light waves are _____.

Longitudinal waves...confirm

16. The increase in capacitance of a capacitor due to presence of dielectric is due to:

Electric polarization

17. The Focal length of convex lens is:

Positive...confirm

18. The AC circuit in which current and voltage are in phase the power factor is

1...confirm

19. The wavelength of red light is 700 nm . Its frequency is _____.

4.29×10^{14} hertz...confirm

20. The known laws of electromagnetism before James Clerk Maxwell were following EXCEPT

Faraday's Law...confirm

21. When some dielectric is inserted between the plates of a capacitor, then capacitance;

Increased.....confirm

22. Which of the following is NOT the characteristic of electromagnetic waves?

- i. They can travel with different speeds in vacuum depending on frequency.....confirm

23. If electric and gravitational force on an electron in uniform electric field balance each other, then the intensity of electric field will be:

$$Mg/q$$

23. The increase in capacitance of

Larger plates provide greater capacity to store electric charge. Therefore, as the area of the plates increase, capacitance increases. Capacitance is directly proportional to the electrostatic force field between the plates. ... Therefore, as the dielectric constant increases, capacitance increases. 07-Jun-2017

a

Electric energy is measured

Watt...confirm

When we accelerate the charge, which types of waves are produced?

Electromagnetic waves....confirm

A particle device transmitted a signal in the form of electromagnetic waves of frequency $7.5 \times 10^8 \text{ Hz}$. What is the wavelength of the signal?

$$0.4\text{m}$$

A step-down transformer is used to:

Decrease the voltage

27. The quantity of $\Delta V / \Delta r$ is called

Potential gradient

28. Which electromagnetic radiation transmits the highest photon energy?

Gamma rays....confirm

29. The reaction of a particle at 50 Hz is 10.0 its reactance at 100Hz becomes

$$5.0$$

30. Work done on a charged particle moving in uniform magnetic field is

Zero....confirm

31. Select the correct statement

Gamma Rays have higher frequency than infrared waves...confirm

32. Which of the following have the greatest wavelength?

Radio waves

33. Potentiometer can be used as

Potential divider....confirm

34. All of the followings are the different types of mental images; people generally experience them while close their eyes except:

Solving an algebra equations

35. The notion that motivational state of the organism is understood and explained in terms of positive and negative environmental stimuli BEST connects to;

Incentive approaches

36. If one wants to increase the capacity of short-term memory, through which process more items can be held?

Chunking....confirm

37. Which physical quantity is produced by a calculation where a charge is

Energy...confirm

38. The current in a car headlamp is 2.0 A. The Headlamp is switched on for 3.0

360 C

39. If potential difference across two plates of a capacitor is doubled, then

Four times....confirm

40. How could the unit of potential difference the volt also be written?

J/C

41. If magnetic field is doubled then magnetic energy density becomes

Four times....confirm

42. The primary of a 3.1 step-up transformer is connected to a source and the secondary this situation is P. If R is connected directly to the source it will dissipate a power of:

P/9....confirm

43. A particle having $2e$ charge falls through a potential difference of $5V$ energy acquired by it is

10 eV

44. A generator supplies $100V$ to the primary coil of a transformer. The primary has 50 turns and the secondary has 500 turns. The secondary voltage is

1000V

45. The combined effect of resistance and reactance is known as

Impedance...confirm

46. A transparent refracting medium bounded by the two curved surfaces called

Prism....confirm

47. A student rubs a rod held in his hand. Which action causes the rod to gain a large electrostatic charge

Rubbing a polythene rod with a woolen duster....confirm

48. A charge of 30 C flows through an electric appliance in 2.0 minutes. What is the average current in the appliance?

0.25A confirm

Total flux through a closed surface depends on

Charge and $-N$...confirm

49. Electromagnetic waves emitted from antenna are

Transverse....confirm

50. Two parallel straight wires carrying current in same direction will.

Attract each other...confirm

51. Charge carriers in electrolysis are:

Positive and negative ions...confirm

52. Capacitive reactance X_C is

$\frac{1}{2\pi fC}$

53. The number of turns becomes double, but length remain same then magnetic field in the solenoid become

Double...confirm

54. If velocity of a conductor moving through Magnetic field B is made zero then motional emf is

$-vBL$

The amplitude modulation frequency ranges from

540 kHz to 1600 kHz...confirm from net

55. Average value of current and voltage over complete cycle is:

Zero.... Confirm

56. A detector is used to detect the speed at a particular wave if the frequency of an electromagnetic signal is 400 MHz, the speed define the detector is

300000 km/s

57. The product of resistance and capacitance is called

Time....confirm

58. Greenhouse gases absorb ____ radiation

Infrared...confirm

59. In RL series circuit phase angle is given by:

$\tan^{-1}(wL/R)$...confirm

60. One tesla is equal to

N/Am

61. An LC series circuit an inductance L and a capacitance C has an oscillation frequency f. Two inductors each with inductance L, and two capacitors, each with capacitance C, are all wired in series and the circuit is completed. The oscillation frequency is:

f.....confirm

62. Capacitance of a capacitor in vacuum is given by

$A\epsilon_0/d$ confirm

63. Force on a charged particle is zero when projected at angle with the magnetic field

0 degree....confirm

64. If an electron of charge is accelerated through a potential difference V, it will acquire energy.

Ve....confirm

65. In case of metallic conductors, the charge carriers are:

Electrons...confirm

66. Tesla is a unit of

Magnetic flux....confirm

67. When a charge is projected perpendicular to a uniform magnetic field, its path is:

Circular.....confirm

68. Electromagnetic waves do not transport

Charge....confirm

69. The concept of an electric field lines is introduced by

Faraday....confirm

70. A capacitor in an LC oscillator has a maximum potential difference of 15V and a maximum energy of 360 uJ. At a certain instant the energy in the capacitor is 40 uJ. At that instant what is the emf induced in the inductor

5V....confirm

71. The wave form of alternating voltage is a:

Sine wave....confirm

72. If velocity of a conductor moving through a magnetic field B is made zero then motional emf is:

-vBL...confirm

72. Which one of is in the order of decreasing frequency?

Ultraviolet rays, visible light, radio waves...confirm

73. The lenz's law refers to:

Induced current....confirm

74. Which of the following statements is Not true about electromagnetic waves?

The electromagnetic radiation from a burning candle is polarized...confirm

75. Phase different between V and I of on A.C through resistor is:

0 degree

76. Which of the following is equivalent to 1 V?

1 J/C.....confirm

77. Which of the following is equivalent to one coulomb?

One ampere second....confirm

PHY101 QUIZ 4

ORANGE MONKEY TEAM

You are being informed that the 4th online quiz of Physics (PHY101) is going to held on 07th March, 2022 to 08th March, 2022. The quiz will consist of Multiple Choice Questions (MCQs) and cover Lessons 23 to 43.

NOTE

**“QUIZ ATTEMPT KRNY SEY PHELY
GOOGLE ZAROOR SATH MAIN OPEN RKH
LYNA BCUZ MCQS NEW ARAHY HEIN
ABHE BHE THAT”S WHY WAHN PER
SEARHC KRLYNA JOO YAHN SEY NA
MILEIN >>>JAZAKALLAH”**

1. The reason there are two slits, rather than one, in a young's experiment is:

To create a path length difference....confirm from net

2. According to the kinetic theory of gasses, the pressure of a gas is due to:

Change of momentum of molecules as the strike the well....confirm from net

3. What is the name of the relationship between the peak wavelength for a blackbody radiator and its temperature.

Wien's law

4. What is the unit of magnification factor?

No units

5. The special theory of relativity is applicable to the object moving with maximum velocity equal to

More than speed of light

6. A free electron and a free proton have the same kinetic energy . this means that, compared to the matter wave associated with the proton, the matter wave associated with the electron has:

A longer wavelength and the same frequency

7. No entropy change is associated with:

Adiabatic process

8. Electromagnetic waves emitted from antenna are:

Transverse

9. A virtual image is one

From which light rays diverge but do not pass through

10. A detector is used to detect the speed at a particular wave if the frequency of an electromagnetic signal is 400 MHz, the speed define the detector is

300000 km/s

11. Evidence that molecules of a gas are in constant motion is:

Two gases interdi? Use quickly

12. Of the following which is the best evidence for the wave nature of matter?

The photoelectric e? ect

13. For holography we use a beam of:

Laser

14. Interference of light is evidence that:

Light is a wave phenomenon

15. Which of the following types of electromagnetic radiation travels at the greatest speed in vaccum?

(Radio, gamma, x)rays .. all options....confirm

16. The plants look green. It is because they have chlorophyll in them. Chlorophyll makes leaves green to absorb_____.

Green only

17. The most refined form of matter is_____.

Light

18. The known laws of electromagnetism before James Clerk Maxwell were . Except

Faraday's law

19. Which of the following electromagnetic radiations has photons with the greatest energy?

Radio waves

20. The primary of a 3:1 step-up transformer is connected to a source and the secondary is connected to a resistor R. The power dissipated by R in this situation is P. If R is connected directly to the source it will dissipate a power of:

$P/9$

21. The quantum number m_s is most closely associated with what property of the electron in an atom?

Energy

22. The special theory of relativity is based on:

Two postulates

23. The center of Newton's ring is dark due to:

Destructive interference

24. Which electromagnetic radiation transmits the highest photon energy/

Gamma rays

25. Which methods of heat transfer can take place in vacuum?

Radiation

26. An electron is moving at $0.6c$. If we calculate its kinetic energy using $(1/2)mv^2$. We get a result that is:

About 28% too low

27. The wavelength of light beam A is twice the wavelength beam B. the energy of a photon in beam A is:

Half the energy of a photon in beam b

28. The lanz's law refers to :

Induced current

29.

30. Electric energy is measured :

Watt....confirm from ent

31. The lenz's law refers to :

Induced current

32. The films formed due to detergents(soap/shampoo) are due to

interference

33. A free electron and a free proton have the same kinetic energy . this means that, compared to the matter wave associated with the proton, the matter wave associated with the electron has:

A longer wavelength and a smaller frequency confirm from net

34. Of the following. Compton scattering from electrons is most easily observed for:

X rays

35. Of the following which might NOT vanish over one cycle of a cyclic process?

The work done by the substance....confirm from net

36. The most refined form of matter is:

Light

37. How could the unit of potential difference, the volt, also be written?

J/C

38. In Compton scattering from stationary particles the maximum change in wavelength can be made smaller by using.

More massive particles

39. Hotness or coldness of an object is represented in terms of:

Temperature

40. The unit of thermal conductivity might be:

Cal/(cm*s*C?)

41. During the time that latent heat is involved in a change of state.

The temperature does not change

42. A laser in a compact disc player generates light that has a wavelength of 780 nm in air. The light then enters into the plastic of a CD. If the index of refraction of plastic is 1.55, the speed of this light once enter the plastic is _____.

1.94×10^8 m/s

43. Antiparticle of electron is

Positron.....confirm from net

44. When some dielectric is inserted between the plates of a capacitor then capacitance

Increases....confirm from net

45. The centre of Newton ring is dark due to:

Destructive interference

46. If two objects are in thermal equilibrium with each other:

They cannot be at different temperatures....confirm from net

47. The graphical representation of Ohm's law is

Straight line.....confirm from net

48. A particular device transmitted a signal in the form of electromagnetic waves of frequency 7.5×10^8 Hz. What is the wavelength of the signal?

0.4m

41. The resolving power of a telescope can be increased by

Increasing the lens diameter

49. Which physical quantity is produced by a calculation where a charge is multiplied by a potential difference (p.d)?

Energy....confirm form net

50. A transparent refracting medium bounded by the two curved surfaces called:

Prism....confirm from net

51. It is more difficult to measure the coefficient of volume expansion of a liquid than that of a solid because?

The containing vessel also expands....confirm form net

52. The product of resistance and capacitance is called

Time....confirm from net

53. The potential difference between the ends of a conductor is 12 V. How much electrical energy is converted to other forms of energy in the conductor when 100C of charge flows through it?

1200....confirm form net

54. When we accelerate the charge, which types of waves are produced?

Electromagnetic waves

55. Due to relative motion of observer and the frames of reference of events, time always:

statics itself

56. The allowed energy states of atoms or molecules can be described by a set of _____.

Quantum numbers.....confirm

57. Probability values are assigned on a scale of

0 to 1....confirm

58. The magnitude of the momentum of a particle can never exceed:

E/c , where E is its total energy

59.

60. The ratio of the size of image to the size of object.

Angular magnification

61. When white light passes through a prism, it splits into _____ colors.

7.....confirm from net

62. A thermometer indicates 98.6°C. it may be:

IN a cup of hot tea

63. Tesla is a unit of

Magnetic flux

64. A light entering into glass prism from air does not give change in its:

Frequency

65. The total energy in an LC circuit is 5.0×10^{-6} J. If $L = 25$ mH the maximum current is:

20mA

66. Electromagnetic waves do not transport:

Charge

67. A heat of transformation of a substance is:

The energy per unit mass absorbed as heat during a phase transformation

68. Which of the following is true of all virtual images?

None of these

69. $2d \sin \theta = m\lambda$ is called

bragg equation

70. No lens is perfect because _____.

They suffer from aberration

71. A basic postulate of Einstein's theory of relativity is

The laws of physics must be the same of observers moving with uniform velocity relative to each other.

72. Evidence that a gas consists mostly of empty space is the fact that

Heating a gas increases the molecular motion

73. The number of turns becomes double, but length remain same, then magnetic field in the solenoid become.

Double

74. Which of the following electromagnetic radiations has photons with the greatest energy?

X rays

75. When two objects come to common temperature, the body is said to be in:

Thermal equilibrium....confirm from net

76. If electric and gravitational force on an electron in a uniform electric field balance each other, then the intensity of electric field will be:

Mg/q

77. Electromagnetic waves do not transport:

Charge

78. During a slow adiabatic expansion of a gas

No energy enters or leaves as heat

79.

80. A free electron and a free proton have the same kinetic energy. This means that, compared to the matter wave associated with the proton, the matter wave associated with the electron has.

A longer wavelength and the same frequency

81. The quantity $\Delta(V)/\Delta(r)$ is called

Potential gradient

82. If two objects are in thermal equilibrium with each other.

They cannot be at different temperatures

83. A consequence of Einstein's theory of relatively is:

Moving clocks run more slowly than when they are at rest

84. In order that a signal process is both isothermal and isobaric

A change of phase is essential

85. The specific heat of a substance is:

The amount of heat energy per unit mass to raise the temperature of the substance by 1°C

86. The electron states that constitute a single shell for an atom all have:

The same value of n

87. An isothermal process for an ideal gas is represented on a p-V diagram by:

A portion of a hyperbola

88. The concept of an electric field lines is introduced by:

Faraday

89. The current in a car headlamp is 2.0A. The headlamp is switched on for 30 minutes. How much charge passes through the headlamp?

360 C

90. In some movies, you sometimes see an actor looking in a mirror and you can see his face in the mirror. During the filming of this scene, what does the actor see in the mirror?

The movie camera

91. The Pauli exclusion principle is obeyed by:

All particles with spin quantum numbers of $\frac{1}{2}$

92. The focal length of a convex lens is:

Positive

93. An electron ($m = 9.11 \times 10^{-31} \text{ kg}$) has a speed of 0.95c. Its kinetic energy is;

$1.8 \times 10^{-13} \text{ J}$

94. An electron ($m = 9.11 \times 10^{-31} \text{ kg}$) has a speed of 0.95c. Its kinetic energy is:

$1.8 \times 10^{-13} \text{ J}$

95. An electron ($m = 9.11 \times 10^{-31} \text{ kg}$) has a momentum of $4.0 \times 10^{-22} \text{ kg}\cdot\text{m/s}$. Its kinetic energy:

$6.3 \times 10^{-14} \text{ J}$

96. Force on a charged particle is zero when projected at angle with the magnetic field

0 degree

97. Heat is:

Energy transferred by virtue of a temperature difference

98. When a charge is projected perpendicular to a uniform magnetic field, its path is:

Circular

99. If potential difference across two plates of a capacitor is doubled, then energy stored in it will be:

Four times

100. charge carriers are.

In case of metallic conductors, the

Electrons

101. degrees on the:

Room temperature is about 20 to 22

Celcius scale

102. degrees on the

Room temperature is about 68 to 72

Fahreheit scale

103. an observer on Earth, the distance from earth star measured by an observer in a moving spaceship would seem:

As compared to distance measured by

Same

104. empty space is the fact that

Evidence that a gas consists mostly of

The density of a gas becomes much greater when it is
liquefied....confirm

105.

106.

For an electron, the rest mass energy is:

0.511 MeV.....confirm from net

107.

Antiparticle of electron is:

Position

108.

According to the first law of thermodynamics, applied to a gas, the increase in the internal energy during any process

net

Equals the heat input plus the work done on the gas....confirm from

109.

The approach to personality stresses that people possess a basic goodness, and have a natural tendency to grow to higher levels of functioning is.

humanistic....confirm from net

110.

In a photoelectric experiment at a frequency above cut off, the stopping potential is proportional to :

The energy of the most energetic electron after it is ejected....confirm from net

111.

There is a temperature at which the reading on the kelvin scale is numerically:

Equal to that on the Celsius scale

112.

When you stand in front of a plane mirror, your image is:

Virtual, erect and the same size as you

113.

When a ray of light travels from a lesser denser medium to denser medium then _____.

It bends towards the normal

114.

Entropy measure the:

Energy of a system

115.

The theoretical upper limit for the frequency of electromagnetic waves is:

There is no upper limit

116. The special theory of relativity is applicable to the object moving with maximum velocity equal to:

Speed of light

117. According to the special theory of relativity:

All forms of energy have mass-like properties

118. In constructing a thermometer it is necessary to use a substance that:

Undergoes some change when heated or cooled

119. A particle with rest mass m moves with speed $0.6c$. its kinetic energy is:

$0.25 mc^2$

120. J.J Thompson's measurement of e/m for electrons provides evidence of the:

Particle nature of matter

121. Polarization means _____.

To alter the wavelength of the light

122. Emission of electron by metals on heating is called

Thermionic emission

123. The specific heat of a substance is: the amount of heat energy per unit mass to raise the temperature of the substance by 1°C

124. An erect object is in front of a convex mirror a distance greater than the focal length. The image is:

Virtual, erect, and smaller than the object.....confirm from net

125. The appearance of colors in thin film is due to:

Interface.....confirm from net

126. A student rubs a rod held in his hand.
Which action causes the rod to gain a large electrostatic charge?

Rubbing a polythene rod with a woolen duster

127. Two parallel straight wires carrying
current in same direction

Attract each other

128.

129.

One tesla is equal to

N/Am.....confirm from net

130.

constant is:

The process for which entropy remains

A reversible process

131.

due to:

The appearance of colors in thin film is

interference

132.

radiation

Greenhouse gases absorb _____

Infrared

133.

frequency of electromagnetic waves is:

The theoretical upper limit for the

There is no upper limit

134.

Heat has the same units as:

Work

135.

given by:

Capacitance of a capacitor in vacuum is

$\epsilon_0 A / d$

136.

the principal quantum number:

An electron in a K shell of an atom has

$N = 1$

137. When an electromagnetic wave meets a reflecting surface, the direction taken by the reflected wave is determined by:

The angle of incidence

138. Capacitive reactance X_c is

$\frac{1}{2(\pi)fc}$

139. Bending of light around the edges of an obstacle called:

Diffraction

140. In RL series circuit phase angle is given by:

$\tan^{-1}(\omega L/R)$

141. Interface of light is evidence that:

Light is a wave phenomenon

142. In a photoelectric effect experiment at a frequency above cut off the number of electrons ejected is proportional to:

The number of photons that hit the sample.....confirm from net

143. In a photoelectric effect experiment the stopping potential is:

The electric potential that causes the electron current to vanish...confirm from net

144. In an adiabatic process:

The work done by the environment on the system equals the change in internal energy....confirm from net

145. A free electron and a free proton have the same kinetic energy. This means that, compared to the matter wave associated with the proton, the matter wave associated with the electron has:

A longer wavelength and the same frequency...confirm from net

146. Polarization experiments provide evidence that light is:

A transverse wave....confirm from net

147. If light of low wavelength is used in young's double slit experiment, then width of the fringe will:

Decreases....confirm from net

148. Lenz's law is in accordance with law of conservation of

Energy....confirm from net

149. AN LC series circuit with an inductance L and a capacitance C has an oscillation frequency f. Two inductors, each with inductance L, and two capacitors, each with capacitance C, are all wired in series and the circuit is completed. The oscillation frequency is:

F

150. The known laws of electromagnetism before James Clerk Maxwell were following EXCEPT:

Faraday's Law

151. A particle having $2e$ charge falls through a potential difference of 5V energy acquired by it is.

10eV

152. According to relatively theory a particle of mass m with a momentum of $2mc$ has a speed of:

$c/2$

153. If the kinetic energy of a free particle is much less than its rest energy then its kinetic energy is proportional to:

The square of the magnitude of its momentum

154. The two metallic strips that constitute some thermostats must differ in:

Coefficient of linear expansion

155. Phase difference between V and I of an AC through resistor is:

0 degree

156. Average value of current and voltage over complete cycle is:

zero

157. A detector is used to detect the speed of a particular wave. If the frequency of an electromagnetic signal is 400 MHz, the speed detected by detector is _____.

300000 km/s

158. Inductive reactance X_L of an inductor is:

$2\pi f L$ confirm from net

159. An inductor may store energy in its:

Magnetic field....confirm from net

160. If velocity of a conductor moving through a magnetic field B is made zero then motional emf is:

$-vBL$





PHY101-Physics
(LAST TIME PAPER)
(MCQ's)



Junaidfazal08@gmail.com
Bc190202640@vu.edu.pk

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1. The units of the Planck constant h are those of:

- A. energy
- B. power
- C. momentum
- D. angular momentum
- E. frequency

2. Which of the following is true of all virtual images?

- A. They can be seen but not photographed
- B. They are ephemeral
- C. They are smaller than the objects
- D. They are larger than the objects
- E. None of the above

ans: E

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

- A. expands with rising temperature
- B. expands linearly with rising temperature
- C. will not freeze
- D. will not boil
- E. undergoes some change when heated or cooled

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4. A 60-watt light bulb carries a current of 0.5 A. The total charge passing through it in one hour is:

- A. 120 C
- B. 3600 C
- C. 3000 C
- D. 2400 C
- E. 1800 C**

5. If the charge on a parallel-plate capacitor is doubled:

- A. the capacitance is halved
- B. the capacitance is doubled
- C. the electric field is halved
- D. the electric field is doubled**

6. the wavelength of red light is 700 nm. Its frequency is:

- A. 4.30×10^4 Hertz
- B. 4.30×10^5 Hertz** NOT SURE
- C. 4.30×10^3 Hertz
- D. 4.30×10^2 Hertz

7. A capacitor C “has a charge Q”. The actual charges on its plates are:

- A. Q, Q
- B. $Q/2$, $Q/2$
- C. Q, $-Q$**

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D. $Q/2, -Q/2$

8. How fast should you move away from a 6.0×10^{14} Hz light source to observe waves with a frequency of 4.0×10^{14} Hz?

A. $0.20c$

B. $0.38c$

C. $0.45c$

D. $0.51c$

E. $0.76c$

9. The units of the electric field are:

A. $J/(C \cdot m)$

B. J/C

C. $J \cdot C$

D. J/m

10. If two light waves are coherent:

A. their amplitudes are the same

B. their frequencies are the same

C. their wavelengths are the same

D. their phase difference is constant

11. In a photoelectric effect experiment at a frequency above cut off, the stopping potential is proportional to:

A. the energy of the least energetic electron before it is ejected

B. the energy of the least energetic electron after it is ejected

C. the energy of the most energetic electron before it is ejected

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D. the energy of the most energetic electron after it is ejected

12. The total energy in an LC circuit is 5.0×10^{-6} J. If $L = 25$ mH the maximum current is:

A. 10 mA

B. 14 mA

C. 20 mA

D. 28 mA

13. The quantum number m_s is most closely associated with what property of the electron in an atom?

A. Magnitude of the orbital angular momentum

B. Energy

C. z component of the spin angular momentum

D. z component of the orbital angular momentum

14. If 500 J of work are required to carry a charged particle between two points with a potential difference of 20 V, the magnitude of the charge on the particle is:

A. 0.040 C

B. 12.5 C

C. 20 C

D. cannot be computed unless the path is given

15. The smallest particle of any chemical element that can exist by itself and yet retain the qualities that distinguish it as that element is

: A. an electron

B. a proton

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C. a neutron

D. an atom

E. a molecule

16. A particle with a charge of $5.5 \times 10^{-8} \text{ C}$ is 3.5 cm from a particle with a charge of $-2.3 \times 10^{-8} \text{ C}$. The potential energy of this two-particle system, relative to the potential energy at infinite separation, is:

A. $3.2 \times 10^{-4} \text{ J}$

B. $-3.2 \times 10^{-4} \text{ J}$

C. $9.3 \times 10^{-3} \text{ J}$

D. $-9.3 \times 10^{-3} \text{ J}$

E. zero

17. A farad is the same as a:

A. J/V

B. V/J

C. C/V

D. V/C

E. N/C

18. 1 weber is the same as:

A. 1 V/s

B. 1 T/s

C. 1 T/m

D. $1 \text{ T} \cdot \text{m}^2$

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19. coherent sources of light mean

- A. They must have same speeds
 - B. They must have same frequency
 - C. They must have same amplitude
 - D. They must have fixed phase relative to each other
- not sure

20. Room temperature is about 20 degrees on the:

- A. Kelvin scale
- B. Celsius scale
- C. Fahrenheit scale
- D. absolute scale
- E. C major scale

21. The appearance of color in the thin film is due to:

- Interference

22. When you stand in front of a plane mirror, your image is:

- A. real, erect, and smaller than you
- B. real, erect, and the same size as you
- C. virtual, erect, and smaller than you
- D. virtual, erect, and the same size as you

23. In a photoelectric effect experiment at a frequency above cut off, the number of electrons ejected is proportional to:

- A. their kinetic energy

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B. their potential energy

C. the work function

D. the frequency of the incident light

E. the number of photons that hit the sample

24. In a photoelectric effect experiment at a frequency above cut off, the stopping potential is proportional to:

A. the energy of the least energetic electron before it is ejected

B. the energy of the least energetic electron after it is ejected

C. the energy of the most energetic electron before it is ejected

D. the energy of the most energetic electron after it is ejected

E. the electron potential energy at the surface of the sample

25. The units of magnetic dipole moment are:

A. ampere

B. ampere·meter

C. ampere·meter²

D. ampere/meter

26. The primary of a 3 : 1 step-up transformer is connected to a source and the secondary is connected to a resistor R. The power dissipated by R in this situation is P. If R is connected directly to the source it will dissipate a power of:

A. $P/9$

B. $P/3$

C. P

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D. 3P

E. 9P

27. We desire to make an LC circuit that oscillates at 100 Hz using an inductance of 2.5 H. We also need a capacitance of:

A. 1 F

B. 1 mF

C. 1 μF

D. 100 μF

28. An ideal gas expands into a vacuum in a rigid vessel. As a result there is:

A. a change in entropy

B. an increase of pressure

C. a change in temperature

D. a decrease of internal energy

30. A step-down transformer is used to:

A. increase the power

B. decrease the power

C. increase the voltage

D. decrease the voltage

31. Which of the following electromagnetic radiations has photons with the greatest energy?

A. blue light

B. yellow light

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C. x rays

D. radio waves

33. The Stern-Gerlach experiment makes use of:

A. a strong uniform magnetic field

B. a strong non-uniform magnetic field

C. a strong uniform electric field

D. a strong non-uniform electric field

34. Let Q denote charge, V denote potential difference, and U denote stored energy. Of these quantities, capacitors in series must have the same:

A. Q only

B. V only

C. U only

D. Q and U only

35. Let Q denote charge, V denote potential difference, and U denote stored energy. Of these quantities, capacitors in parallel must have the same:

A. Q only

B. V only

C. U only

D. Q and U only

36. . “The sum of the currents into a junction equals the sum of the currents out of the junction” is a consequence of:

A. Newton’s third law

B. Ohm’s law

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C. Newton's second law

D. conservation of energy

E. conservation of charge

ans: E

37. "The sum of the emf's and potential differences around a closed loop equals zero" is a consequence of:

A. Newton's third law

B. Ohm's law

C. Newton's second law

D. conservation of energy

E. conservation of charge

38. Evidence for the wave nature of matter is:

A. **electron diffraction experiments of Davisson and Germer**

B. Thompson's measurement of e/m

C. Young's double slit experiment

D. the Compton effect

39. A conducting sphere with radius R is charged until the magnitude of the electric field just outside its surface is E . The electric potential of the sphere, relative to the potential far away, is:

A. zero

B. E/R

C. E/R^2

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D. **ER**

40. radio waves and light waves are ;

- **Electromagnetic and transverse**

41. An ideal gas expands into a vacuum in a rigid vessel. As a result there is:

A. a change in entropy

B. an increase of pressure

C. a change in temperature

D. a decrease of internal energy

42. Capacitors A and B are identical. Capacitor A is charged so it stores 4 J of energy and capacitor B is uncharged. The capacitors are then connected in parallel. The total stored energy in the capacitors is now:

A. 16 J

B. 8 J

C. 4 J

D. 2 J

43. Capacitors C1 and C2 are connected in parallel. The equivalent capacitance is given by:

A. $C_1 C_2 / (C_1 + C_2)$

B. $(C_1 + C_2) / C_1 C_2$

C. $1 / (C_1 + C_2)$

D. C_1 / C_2

E. $C_1 + C_2$

ans: E

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44. Capacitors C_1 and C_2 are connected in series. The equivalent capacitance is given by:

A. $C_1 C_2 / (C_1 + C_2)$

B. $(C_1 + C_2) / C_1 C_2$

C. $1 / (C_1 + C_2)$

D. C_1 / C_2

E. $C_1 + C_2$

45. During an adiabatic process an object does 100 J of work and its temperature decreases by 5 K. During another process it does 25 J of work and its temperature decreases by 5 K. Its heat capacity for the second process is:

A. 20 J/K

B. 24 J/K

C. 5 J/K

D. 15 J/K

46. A virtual image is one:

A. toward which light rays converge but do not pass through

B. from which light rays diverge but do not pass through

C. from which light rays diverge as they pass through

D. toward which light rays converge and pass through

47. A generator supplies 100 V to the primary coil of a transformer. The primary has 50 turns and the secondary has 500 turns. The secondary voltage is:

A. 1000 V

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B. 500 V

C. 250 V

D. 100 V

48. The rate at which electrical energy is used may be measured in:

A. watt/second

B. watt·second

C. watt

D. joule·second

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

Answer: They can, as this possibility is not contradicted by any of our descriptions of the motion of gases. If the vessel contains more than a few molecules, it is highly improbable that all will have the same speed. Collisions will make their speeds scatter according to the Boltzmann distribution law."

QUESTION: Electric potential energy:

Answer:

The electric potential is the energy of a unit charge in an electric field. So in our MKS units the unit of potential is 1Joule/Coulombs=1 Volt. Another useful unit is 1Electron Volt.

QUESTION: All objects radiate energy then why are we not able to see all the objects in the dark? Our eyes are not sensitive to infrared radiation so we do not see it. Cold bodies radiate mostly in the infrared zone (invisible to the human eye), but as the temperature increases the body will emit higher frequencies with more intensity. So room temperature objects will not be seen due to black body radiation.

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QUESTION: In a cool room, metal and marble is cool but wood is not cool when we touch. Why?

Answer: Because metal and stone conduct heat better than wood. Skin temperature is higher than room temperature, so when we touch metal, we give heat more quickly to the metal than wood. Another reason is that metal and stone store more energy than a like sized object of wood

QUESTION: what causes electric shock or voltage?

ANS: one clock is upstairs of the bedroom and second clock is in downstairs of the kitchen. Then which clock runs slowly?

Really, neither will run appreciably slower than the other. In the strictest sense, the clock in the upstairs bedroom is moving a few centimeters per year faster than the clock downstairs in the kitchen, because it is a few feet further from the Earth's center than the clock in the upstairs.

QUESTION: Difference between reflection and refraction?

ANS:

Reflection involves a change in direction of waves when they bounce off a barrier. Refraction of waves involves a change in the direction of waves as they pass from one medium to another. Refraction, or the bending of the path of the waves, is accompanied by a change in speed and wavelength of the waves.

Question:

If an electron and proton have same De Broglie's wavelength, which particle has greater speed

The de Broglie wavelength of a particle is inversely proportional to its momentum $p = m v$; since a proton is about 1800 times more massive than an electron, its momentum at the same speed is 1800 times that of an electron, and therefore its wavelength 1800 times smaller. The electron has the longer wavelength.

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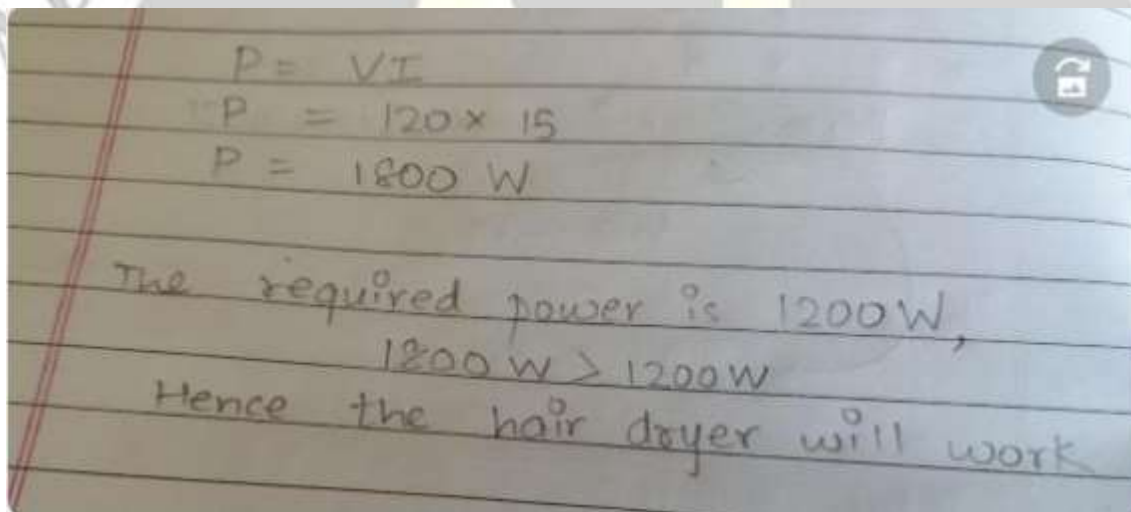
QUESTION: black and black body radiation?

ANS:

An object that absorbs all radiation falling on it, at all wavelengths, is called a black body. When a black body is at a uniform temperature, its emission has a characteristic frequency distribution that depends on the temperature. Its emission is called black-body radiation.

For examples include the heating element of a toaster and the filament of a light bulb.

QUESTION: If a 120 line to shocked is limited 15a by a safety fuse will it operate a 1200w hair dryer?



Handwritten calculation on lined paper:

$$P = VI$$
$$P = 120 \times 15$$
$$P = 1800 \text{ W}$$

The required power is 1200W,
 $1800 \text{ W} > 1200 \text{ W}$
Hence the hair dryer will work

QUESTION: Define statically mechanics

Ans: - The study of heat, considered as arising from the random motion of the basic constituents of matter, is an area of physics called statistical mechanics.

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QUESTION: is it true to say that Centre of mass and Centre of gravity are the same? Either yes or no explain in each case.

Answer: Many people assume that the terms “Centre of mass” and “Centre of gravity” are synonymous, but this is not the case. The center of mass and the Centre of gravity of an object are in the same position if the gravitational field in which the object exists is uniform.

QUESTION: What is the work done? If Force is 500N, height of downwards cliff is 30m Email and angle with land is 30 degrees.?

QUESTION: Magnetic Flux and Magnetic Flux density and when Flux is maximum and when it is zero?

ANS:

Because the induced EMF is proportional to the time rate of change of the magnetic flux, not to the magnetic flux itself, as shown in Faraday's law. In a sinusoidal wave, the maximum rate of change occurs at the zero crossing; in that point, the slope of the line tangent to the wave is the greatest, so the rate of change is the greatest (recall the derivative of a invariable function gives the slope of such function at each point). At the maximum or minimum value, the slope of the tangential line is zero, since it's a horizontal line, so the rate of change is zero.

The magnetic flux as a function of time is

$$\Phi(t) = B \cdot A(t) = BA \cos(\omega t)$$

$$\Phi(t) = B \cdot A(t) = BA \cos(\omega t) \quad \Phi(t) = B \cdot A(t) = BA \cos(\omega t)$$

B = the magnetic field and

$A(t)$ = the area vector as a function of time

ωt = the angle between the field and the area vector as a function of time.

$$\cos(90) = 0$$

But

Then the rate of change of the flux as a function of time is

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$$\Phi'(t) = -BA\omega \sin(\omega t)$$

$$\Phi'(t) = -BA\omega \sin(\omega t) \quad \Phi'(t) = -BA\omega \sin(\omega t)$$

the angle between (the area vector and the magnetic field) = zero.

flux = nonzero and equal to AB , its maximum, but the rate of change of the flux vanishes because

$$\sin(0) = 0, \sin(90) = 1.$$

QUESTION: How Isotopes change Atomic Mass, Magnetic spin moment and Chemical behavior of Elements

ANS:

Isotopes are atoms that have the same number of protons and electrons, but a different number of neutrons. Changing the number of neutrons in an atom does not change the element. Atoms of elements with different numbers of neutrons are called "isotopes" of that element. Isotopes behave similarly to other isotopes of the same element in chemical reactions because such reactions don't depend on the properties of atomic nuclei. Rather they depend on the number and arrangement of an atom's electrons.

QUESTION: Similarity and difference of gland meter and electric motor

ANS:

The motor requires Electricity, but the generator produces electricity.

The shaft of the motor is driven by the magnetic force developed between the armature and the field winding, while in the case of the generator the shaft is connected to the rotor and driven by mechanical force

QUESTION: Fundamental source of Electromagnetic radiation

ANS:

A moving charge particle is the fundamental source of electromagnetic radiation.

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QUESTION: A photon of green light has a wavelength of 530nm. Find the photon's frequency, magnitude of momentum and electron volts. Express the energy in joules and electron volts.

ANS:

TAKE IDEA FROM THIS LINK

<https://socratic.org/questions/calculate-the-energy-in-joules-of-a-photon-of-green-light-having-a-wavelength-of>

<https://www.numerade.com/questions/a-photon-of-green-light-has-a-wavelength-of-520-nm-find-the-photon's-frequency-magnitude-of-momentum-/>

QUESTION: Find the difference between two waves which interfere constructively and destructively.

ANS:

There are two types of interference, constructive and destructive. In constructive interference, the amplitudes of the two waves add together resulting in a higher wave at the point they meet. In destructive interference, the two waves cancel out resulting in a lower amplitude at the point they meet.

QUESTION: Similarity and difference of galvanometer and electric motor

ANS:

Galvanometers and electric motors are both based on the same basic principle of **an external magnetic field exerting** a force on a current carrying wire. The difference is in how far the device is allowed to move. Motors must be able to move freely and rotate through complete 360° turns.

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QUESTION:

A 2000kg car is moving with a velocity of 20 m/s collides and locks with a 1500 kg car at rest a stop sign. Show the momentum is conserved.

A 2000-kg car moving with a speed of 20 m/s collides with and sticks to a 1500-kg car at rest at a stop sign. Show that because momentum is conserved in the rest frame, momentum is also conserved in a reference frame moving with a speed of 10 m/s in the direction of the moving car

QUESTION:

If you hold water in a paper cup over flame, can you bring the water to boil, if then how?

Just fill a **paper cup** with **water** and start trying to burn it from the outside. The **water** will boil vigorously inside the **cup**, but the **paper** itself will not combust. ... The **boiling water** can't get above 212 degrees, and the **paper** is thin enough that this **water** keeps its temperature from climbing high enough to combust.

Question: What is Corona?

Ans:

A corona discharge is **an electrical discharge caused by the ionization of a fluid** such as air surrounding a conductor carrying a high voltage. A corona occurs at locations where the strength of the electric field (potential gradient) around a conductor exceeds the dielectric strength of the air.

Question: Greenhouse effect explain.

Ans:

The greenhouse effect is a natural process that warms the Earth's surface. When the Sun's energy reaches the Earth's atmosphere, some of it is

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reflected back to space and the rest is absorbed and re-radiated by greenhouse gases. The absorbed energy warms the atmosphere and the surface of the Earth



Phy101 Quiz 3

1. Lenz's law is in accordance with law of conservation of
Energy...confirm
2. Which of the following types of electromagnetic radiation at the greatest speed in vacuum?
All of these travels at the same speed....confirm
3. Inductive reactance X_L of an inductor is
 $2(\pi)fL$ confirm
4. Force per unit charge is:
Electric field intensity...confirm
5. The sum of electric and magnetic force is called
Lorentz force...confirm
6. Radio waves and light waves are _____.
Electromagnetic and transverse both...confirm
7. Kirchhoff's 1st rule is the manifestation of the law of conservation of
Charge...confirm
8. Kirchhoff's 2nd rule is the manifestation of the law of conservation of
Energy...confirm
9. The total energy in an circuit is 5.0×10^{-6} J. if $L=25\text{mH}$ the maximum current is:
20mA...confirm
10. If I_0 is the peak value of an AC supply, then its rms value is given as firms
 $I_0/\text{square root}2$ confirm

11. The potential difference between the ends of a conductor is 12V. How much electrical energy is converted to other forms of energy in the conductor when 100C of charge flows through it?
1200J....confirm
12. A particle carrying a charge of $2e$ falls through potential difference of 3V the energy acquired by it will be:
6 eV...confirm
13. An inductor may store energy in its:
Magnetic field...confirm
14. The graphical representation of Ohm's law is:
Straight line...confirm
15. Radio waves and light waves are_____.
Longitudinal waves...confirm
16. The increase in capacitance of a capacitor due to presence of dielectric is due to:
Electric polarization
17. The Focal length of convex lens is:
Positive...confirm
18. The AC circuit in which current and voltage are in phase the power factor is
1...confirm
19. The wavelength of red light is 700 nm. Its frequency is_____.
 4.29×10^{14} hertz...confirm
21. The known laws of electromagnetism before James Clerk Maxwell were following EXCEPT
Faraday's Law...confirm
20. When some dielectric is inserted between the plates of a capacitor, then capacitance;
Increased....confirm
21. Which of the following is NOT the characteristics of electromagnetic waves?
They can travel with different speeds in vacuum depending on frequency.....confirm
22. If electric and gravitational force on an electron in uniform electric field balance each other, then the intensity of electric field will be:
 Mg/q
23. The increase in capacitance of a
24. Electric energy is measured
WaTT...confirm
25. When we accelerate the charge, which types of waves are produced
Electromagnetic waves....confirm
26. A particle device transmitted a signal in the form of electromagnetic waves of frequency 7.5×10^8 Hz. What is the wavelength of the signal.
0.4m
27. A step-down transformer is used to:
Decrease the voltage

27. The quantity of $\Delta V / \Delta r$ is called
Potential gradient
28. Which electromagnetic radiation transmits the highest photon energy?
Gamma rays....confirm
29. The reaction of an particle at 50 Hz is 10.0 its reactance at 100Hz becomes
5.0
30. Work done on a charged particle moving in uniform magnetic field is
Zero....confirm
31. Select the correct statement
Gamma Rays have higher frequency than infrared waves...confirm
32. Which of the following have the greatest wavelength
Radio waves
33. Potentiometer can be used as
Potential divider....confirm
34. All of the followings are the different types of mental images; people generally experience them while close their eyes Except:
Solving an algebra equations
35. The nation that motivational state of the organism is understood and explained in terms of positive and negative environmental stimuli BEST connects to;
Incentive approaches
36. If one wants to increase the capacity of short-term memory, through which process more items can be held?
Chunking....confirm
37. Which physical quantity is produced by a calculation where a charge is
Energy...confirm
38. The current in a car headlamp is 2.0 A. The Headlamp is switched an for 3.0
360 C
39. If potential difference across two plates of a capacitor is doubled, then
Four times....comfirm
40. How could the unit of potential difference the volt also be written?
J/C
41. If magnetic field is doubled then magnetic energy density becomes
Four times....confirm
42. The primary of a 3.1 step-up transformer is connected to a source and the secondary this situation is P. If R is connected directly to the source it will dissipate a power of:
P/9....confirm
43. A particle having $2e$ charge falls through a potential difference of 5.V energy acquired by it is
10 eV
44. A generator supplies 100V to the primary call of a transformer. The primary has 50 turns and the secondary has 500 turns. The secondary voltage is
1000V
45. The combined effect of resistance and reactance is known as
Impedance...confirm

46. A transparent refracting medium bounded by the two curved surfaces called
Prism...confirm
47. A student rubs a rod held in his hand. Which action causes the rod to gain a large electrostatic charge
Rubbing a polythene rod with a woolen duster...confirm
48. A charge of 30 C flows through an electric appliance in 2.0 minutes. What is the average current in the appliance?
0.25A...confirm
51. Total flux through a closed surface depends on
Charge and -N...confirm
49. Electromagnetic waves emitted from antenna are
Transverse...confirm
50. Two parallel straight wires carrying current in same direction will.
Attract each other...confirm
51. Charge carriers in electrolysis are:
Positive and negative ions...confirm
52. Capacitive reactance X_C is
 $1/2\pi fC$
53. The number of turns becomes double, but length remain same then magnetic field in the solenoid become
Double...confirm
54. If velocity of a conductor moving through Magnetic field B is made zero then motional emf is
 $-vBL$
58. The amplitude modulation frequency ranges from
540 kHz to 1600 kHz...confirm from net
55. Average value of current and voltage over complete cycle is:
Zero...confirm
56. A detector is used to detect the speed at a particular wave if the frequency of an electromagnetic signal is 400 MHz, the speed define the detector is
300000 km/s
57. The product of resistance and capacitance is called
Time...confirm
58. Greenhouse gases absorb ____ radiation
Infrared...confirm
59. In RL series circuit phase angle is given by:
 $\tan^{-1}(wL/R)$...confirm
60. One tesla is equal to
N/Am
61. An LC series circuit an inductance L and a capacitance C /has an oscillation frequency f . Two inductors each with inductance L , and two capacitors, each with capacitance C , are all wired in series and the circuit is completed. The oscillation frequency is:
 f confirm
62. Capacitance of a capacitor in vacuum is given by
 $A\epsilon_0/d$ confirm
63. Force on a charged particle is zero when projected at angle with the magnetic field

0 degree....confirm

64. If an electron of charge is accelerated through a potential difference V , it will acquire energy.

Ve confirm

65. In case of metallic conductors, the charge carriers are:

Electrons...confirm

66. Tesla is a unit of

Magnetic flux....confirm

67. When a charge is projected perpendicular to a uniform magnetic field, its path is:

Circular.....confirm

68. Electromagnetic waves do not transport

Charge....confirm

69. The concept of an electric field lines is introduced by

Faraday....confirm

70. A capacitor in an LC oscillator has a maximum potential difference of 15V and a maximum energy of 360 μJ . At a certain instant the energy in the capacitor is 40 μJ . At that instant what is the emf induced in the inductor

5V....confirm

71. The wave form of alternating voltage is a:

Sine wave....confirm

72. If velocity of a conductor moving through a magnetic field B is made zero then motional emf is:

$-vBL$...confirm

72. Which one of is in the order of decreasing frequency?

Ultraviolet rays, visible light, radio waves...confirm

73. The lenz's law refers to:

Induced current....confirm

74. Which of the following statements is Not true about electromagnetic waves?

The electromagnetic radiation from a burning candle is polarized...confirm

75. Phase different between V and I of on A.C through resistor is:

0 degree

76. Which of the following is equivalent to 1 V

1 J/C.....confirm

77. Which of the following is equivalent to one coulomb

One ampere second....confirm

PHY101 (Physics)

Recent Papers with their answers

Q1. A photon of green light has a wavelength of 530nm. Find the photon's frequency, magnitude of through 1m width.

Answer: To find the frequency of a photon with a wavelength of 530nm, we can use the formula:

$$c = \lambda \nu$$

Where c is the speed of light, λ is the wavelength, and ν is the frequency.

Rearranging the formula, we get:

$$\nu = c/\lambda$$

Plugging in the values, we get:

$$\nu = (3 \times 10^8 \text{ m/s}) / (530 \times 10^{-9} \text{ m})$$

$$\nu = 5.66 \times 10^{14} \text{ Hz}$$

Therefore, the frequency of the photon is $5.66 \times 10^{14} \text{ Hz}$.

To find the magnitude of the photon's energy through a 1m width, we need to know the photon's energy. The energy of a photon can be calculated using the formula:

$$E = hf$$

Where E is the energy of the photon, h is Planck's constant, and f is the frequency of the photon.

Plugging in the values, we get:

$$E = (6.626 \times 10^{-34} \text{ J s}) \times (5.66 \times 10^{14} \text{ Hz})$$

$$E = 3.75 \times 10^{-19} \text{ J}$$

To find the magnitude of the photon's energy through a 1m width, we need to know the photon flux density. The photon flux density is the number of photons passing through a unit area in a unit time. We can calculate the photon flux density using the formula:

$$\text{Photon flux density} = \text{Power} / (\text{Area} \times c)$$

Where Power is the energy per second, Area is the cross-sectional area of the beam, and c is the speed of light.

Plugging in the values, we get:

$$\text{Photon flux density} = (3.75 \times 10^{-19} \text{ J/s}) / (\pi \times (0.5 \times 1)^2 \text{ m}^2 \times (3 \times 10^8 \text{ m/s}))$$

$$\text{Photon flux density} = 1.50 \times 10^9 \text{ photons/s/m}^2$$

Therefore, the magnitude of the photon's energy through a 1m width is $1.50 \times 10^9 \text{ photons/s/m}^2$.

Q3. Find the difference between two waves which interfere constructively and destructively.

Answer: When two waves interfere constructively, the amplitude of the resulting wave is increased. The difference between the two waves is such that their peaks and troughs line up, resulting in an increase in amplitude.

When two waves interfere destructively, the amplitude of the resulting wave is decreased. The difference between the two waves is such that their peaks and troughs are out of phase, resulting in a cancellation of the amplitude.

Q4. Similarity and difference of Galvano meter and electric motor.

Answer: The Galvanometer and Electric Motor are two different devices that have some similarities and differences.

Similarities:

Both devices have a coil of wire and a magnet that interact with each other to produce motion.

Both devices are based on the principle of electromagnetism.

Both devices can be used to measure electrical currents.

Differences:

The Galvanometer is a measuring instrument that is used to detect small currents, while the Electric Motor is a device that converts electrical energy into mechanical energy to produce motion.

The Galvanometer typically has a very low resistance and is used in circuits where a small current needs to be detected, while the Electric Motor has a higher resistance and is used in circuits where electrical energy needs to be converted into mechanical energy.

The Galvanometer typically has a sensitive pointer or meter to indicate the current, while the Electric Motor typically has a rotating shaft that produces mechanical work.

Q5. Which law used in blackbody radiation?

The law used in blackbody radiation is known as Planck's law. This law describes the spectral energy density of electromagnetic radiation emitted by a blackbody at a given temperature. It states that the energy density of radiation emitted by a blackbody at a given wavelength is proportional to the frequency of the radiation and the temperature of the blackbody. Planck's law was first introduced by Max Planck in 1900 as a theoretical explanation for the observed spectral distribution of radiation emitted by heated objects, such as a blackbody. It played a crucial role in the development of quantum mechanics and was later extended to include other phenomena, such as the photoelectric effect.

Q6. Difference between magnetic flux and magnetic flux density, when flux is max and when it is zero?

Magnetic flux and magnetic flux density are related but distinct concepts in magnetism.

Magnetic flux refers to the total magnetic field passing through a given area. It is represented by the symbol Φ and is measured in units of Weber (Wb). Magnetic flux is a scalar quantity and is calculated by multiplying the magnetic field

strength (B) by the area (A) through which it passes and the cosine of the angle between the field and the normal to the surface.

Magnetic flux density, on the other hand, refers to the strength of the magnetic field in a given region. It is represented by the symbol B and is measured in units of Tesla (T). Magnetic flux density is a vector quantity and is calculated by dividing the magnetic flux by the area through which it passes and the cosine of the angle between the field and the normal to the surface.

When magnetic flux is at its maximum, the magnetic field passing through a given area is at its highest level. This could occur when a magnetic field is applied to a material, creating a strong magnetic field that is passing through a surface. When magnetic flux is zero, there is no magnetic field passing through the given area. This could occur when a magnetic field is removed from a material or when a magnetic field cancels out another magnetic field passing through the same area, resulting in no net magnetic field.

Q7. How isotopes change atomic mass?

Isotopes are different forms of the same element that have the same number of protons but a different number of neutrons in their atomic nucleus. Since the number of protons determines the atomic number of an element, isotopes of the same element have the same atomic number. However, the different number of neutrons means that isotopes have different atomic masses.

When calculating the atomic mass of an element, the atomic masses of all the isotopes of that element are taken into account. The atomic mass of an element is the weighted average of the atomic masses of its isotopes, where the weighting is based on the abundance of each isotope in nature.

For example, the element carbon has two naturally occurring isotopes, carbon-12 and carbon-13. Carbon-12 has an atomic mass of 12 amu (atomic mass units) and makes up about 98.9% of all carbon atoms, while carbon-13 has an atomic mass of 13 amu and makes up about 1.1% of all carbon atoms. The atomic mass of carbon is therefore calculated as:

$$(0.989 \times 12 \text{ amu}) + (0.011 \times 13 \text{ amu}) = 12.01 \text{ amu}$$

As can be seen in this example, the presence of isotopes with different atomic masses can cause the calculated atomic mass of an element to differ slightly from the atomic mass of its most abundant isotope. This effect can be more pronounced for elements with a wider range of isotopes or with isotopes that differ significantly in their relative abundance.

Q8. What is magnetic spin moment?

Magnetic spin moment, also known as spin magnetic moment or simply spin moment, refers to the intrinsic magnetic moment associated with the spin of an elementary particle, such as an electron or a proton. This magnetic moment arises from the spin of the particle, which can be thought of as a rotation of the particle about its own axis.

The spin moment of a particle can interact with an external magnetic field, causing the particle to experience a torque that tends to align its spin axis with the direction of the field. This is the basis of many magnetic phenomena, such as ferromagnetism and Paramagnetism.

The spin moment of an electron is particularly important in magnetism, as it is the source of the magnetic moment in many materials. In ferromagnetic materials, the spin moments of electrons in neighboring atoms align with each other, producing a net magnetic moment that gives rise to a macroscopic magnetic field. In paramagnetic materials, the spin moments of electrons are randomly oriented, but can be aligned in the presence of an external magnetic field.

The spin moment of a particle is often represented by the symbol μ_s , and is typically measured in units of Bohr magnetons (μ_B), where one Bohr magneton is equal to the magnetic moment associated with the electron's orbital motion in the hydrogen atom. The magnitude of the spin moment depends on the type of particle and its intrinsic properties, such as its mass and spin.

Q9. Write down the Chemical behavior of elements.

The chemical behavior of elements refers to how they interact with other elements and compounds in chemical reactions. This behavior is largely determined by the electronic configuration of the elements, which dictates their chemical properties.

Elements in the same group of the periodic table tend to exhibit similar chemical behavior due to their similar electronic configurations. For example, the alkali metals (Group 1) are highly reactive with water and oxygen, while the noble gases (Group 18) are generally unreactive due to their full valence electron shells.

Chemical behavior can also be affected by the presence of other elements or compounds. For example, halogens (Group 17) are highly reactive with alkali metals to form ionic compounds, while nonmetals like carbon and nitrogen can form covalent bonds with each other to form molecules like carbon dioxide and nitrogen gas.

The chemical behavior of an element can also vary depending on its oxidation state, or the number of electrons it has gained or lost in a chemical reaction. For example, iron can exhibit both ferrous (Fe^{2+}) and ferric (Fe^{3+}) oxidation states, which can affect its reactivity with other compounds.

Overall, the chemical behavior of elements is a complex and varied field, but is essential to understanding how different elements can interact with each other to form the wide range of compounds and materials that we observe in the world around us.

Q10. For observing interference, why we use thin slit only? why don't we use thick slit?

Interference is a phenomenon that occurs when two or more waves overlap and combine to form a resultant wave. In order to observe interference, it is necessary to use a device that can create two or more coherent sources of waves that will interfere with each other.

One common device used for this purpose is a double-slit apparatus, which consists of two narrow slits separated by a small distance. When light waves pass through these slits, they diffract and interfere with each other, producing an interference pattern on a screen placed behind the slits.

The reason that thin slits are used instead of thick slits is that thin slits produce a more pronounced diffraction effect, which is essential for creating a clear interference pattern. Thick slits, on the other hand, do not produce as much diffraction, which can result in a weaker interference pattern or no interference pattern at all.

In addition, thin slits allow for a greater degree of control over the interference pattern, as the distance between the slits can be easily adjusted to produce different patterns. Thick slits, by contrast, are less flexible in terms of producing different interference patterns.

Overall, thin slits are preferred for observing interference because they produce a stronger diffraction effect and allow for greater control over the interference pattern.

Q11. Write about plum pudding model that (most important)

a) Who gave give

b) What was its basic features.

c) Why was it wrong?

The plum pudding model was a model of the atom proposed by J.J. Thomson in 1904. The model was based on the idea that atoms were made up of a diffuse cloud of positive charge with electrons embedded within it, much like the plums in a plum pudding.

The basic features of the plum pudding model were that atoms consisted of a positively charged sphere of matter with electrons embedded within it. The positive charge was assumed to be distributed uniformly throughout the sphere, with the electrons occupying the spaces between the positive charges.

Thomson proposed this model based on his discovery of the electron in 1897, which showed that atoms were not indivisible, as had previously been thought. Instead, he believed that atoms were made up of smaller subatomic particles, with the negative electrons held within a positively charged matrix.

However, the plum pudding model was ultimately found to be incorrect. In 1911, Ernest Rutherford and his colleagues performed the famous gold foil experiment, in which they fired alpha particles at a thin sheet of gold foil. They expected the alpha particles to pass through the foil with only minor deflections, in accordance with the plum pudding model. However, they observed that a small fraction of the alpha particles was deflected at large angles, and some even bounced back in the direction they had come from.

This result could not be explained by the plum pudding model, as it predicted that the positive charge was distributed uniformly throughout the atom. Rutherford realized that the positive charge must be concentrated in a small, dense nucleus at the center of the atom, with the electrons orbiting around it. This led to the development of the nuclear model of the atom, which is still the basis of our understanding of atomic structure today.

Q12. composition of sun.

The sun is a massive, luminous ball of gas that is at the center of our solar system. It is composed mostly of hydrogen and helium, with trace amounts of other elements.

About 74% of the sun's mass is hydrogen, while helium makes up about 24%. The remaining 2% is made up of trace amounts of other elements, such as oxygen, carbon, neon, and iron.

The sun's core, where nuclear fusion takes place, is the hottest part of the sun, with temperatures of up to 15 million degrees Celsius. At these temperatures, hydrogen atoms are fused together to form helium, releasing vast amounts of energy in the process. This energy radiates outwards through the sun's layers, eventually reaching the surface and escaping into space as light and heat.

In addition to the elements that make up the sun, it also contains various layers with different characteristics. The outermost layer, known as the corona, is composed of highly ionized gas that extends far into space. Beneath the corona is the chromosphere, which is a layer of cooler, dense gas that is visible during solar eclipses. The layer below the chromosphere is the photosphere, which is the visible surface of the sun and the layer where most of the sun's light and heat is emitted.

Overall, the sun is a complex and dynamic object, and its composition and structure play a crucial role in shaping the behavior of the solar system as a whole.

Mix Shorts

Question. 1: Do you think clock speed is slower than stationery time.

Question. 2: wave speed is function of frequency are you familiar with this, if we increase frequency than what happened to the speed of wave.

Question. 3: Magnetic field exert force or not while in the presence of charge particles?

Question. 4: what is luckawa force and what is range of it.

Question. 5: Numerical tha Neutron, Deuteron electron ki charges maloom krni thi.

Question. 6: Define capacitors resisters etc.

Long Questions:

Question 1. Define Quantum Revolution.

Question 2. Numerical tha magnetic field maloom krni thi.

Question 3. Capacitor parral me connected hen unka formula batane the ur charge maloom krni thi etc.

Question 4. Relativity ka numerical tha planks constant etc.

Question 2: Yes, wave speed is typically proportional to frequency, with higher frequencies corresponding to higher wave speeds. This relationship is expressed by the equation $v = f\lambda$, where v is the wave speed, f is the frequency, and λ is the wavelength.

Question 3: Yes, magnetic fields can exert a force on charged particles that are moving through them. This is the basis of many important phenomena, such as the operation of electric motors and the behavior of charged particles in particle accelerators.

Question 6: Capacitors and resistors are both electrical components that are used in electronic circuits. A capacitor stores electrical charge and is characterized by its capacitance, which is measured in farads (F). A resistor limits the flow of electrical current and is characterized by its resistance, which is measured in ohms (Ω).

Long Questions:

Question 1: The quantum revolution refers to a period of scientific discovery in the early 20th century that fundamentally changed our understanding of the nature of matter and energy. It was characterized by the development of quantum mechanics, a new branch of physics that describes the behavior of particles at the atomic and subatomic level. Key figures in the quantum revolution include Max Planck, Albert Einstein, Niels Bohr, Werner Heisenberg, and Erwin Schrödinger.

Question 3: To calculate the total charge on capacitors connected in parallel, you can use the equation $Q = CV$, where Q is the total charge, C is the capacitance of each capacitor, and V is the voltage applied to the capacitors. The charge on each capacitor is equal to the product of its capacitance and the voltage applied to it. Resistors, on the other hand, limit the flow of electrical current and are characterized by their resistance, which is measured in ohms (Ω).

MIX

1. Does your bathroom mirror show you older and younger than you actually.
2. What is the advantage of transmitting power at high voltage, will the transformer operate, if a battery is used for input voltage primary.
3. If the field charge inside a closed surface is known both the distribution of the charge is unsatisfied, can you use Gauss law to find electric field.
4. Many traffic lights change when a car rolls up intersection. How does light sense the presence of car.

ANSWERS

No, your bathroom mirror does not show you as older or younger than you actually are. However, mirrors do reflect an image that is flipped horizontally, so your left side appears on the right and vice versa.

Transmitting power at high voltage has the advantage of reducing energy losses due to resistance in the transmission lines. This is because power loss is proportional to the square of the current, and higher voltages allow for lower currents to achieve the same power transmission. A transformer will only operate if there is a changing magnetic field, so a battery would not be able to drive the primary coil of a transformer.

Yes, Gauss's law can be used to find the electric field inside a closed surface if the charge distribution is known. Gauss's law states that the total electric flux through a closed surface is proportional to the charge enclosed by the surface. By applying Gauss's law, it is possible to find the electric field at any point inside the closed surface.

Many traffic lights use sensors to detect the presence of vehicles at an intersection. These sensors can be inductive loops embedded in the roadway, which detect changes in magnetic fields as vehicles pass over them. They can also be infrared sensors that detect the presence of vehicles by measuring changes in the infrared radiation emitted by the vehicles. Once the presence of a vehicle is detected, the traffic light can change accordingly to allow for safe and efficient traffic flow.

1. What becomes of isotopes that undergo alpha decay? Which produces a higher counting rate or radiation dectr a gram of radioactive having a short half-life r gram having a long half-life.
2. Explain solar zone. What is its other name?
3. Distinguish between electric potential and electric potential energy. A negative charge move in the direction of uniform.
4. What is Yukawa Force and its range
5. Define thermometer, internal energy, Heat
6. What is the pressure of sun?

Answers:

1. Isotopes that undergo alpha decay emit alpha particles, which are helium nuclei consisting of two protons and two neutrons. As a result, the atomic number of the parent nucleus decreases by two, while the atomic mass decreases by four. The daughter nucleus produced by alpha decay has a lower energy state than the parent nucleus. A gram of radioactive material with a short half-life will produce a higher counting rate of radiation compared to a gram of radioactive material with a long half-life because it undergoes radioactive decay more rapidly.
2. The solar zone is the region of the sun's interior where energy is transported by radiation. This region extends from the center of the sun to about 0.7 solar radii. It is also known as the radiative zone because the energy is transported by radiation rather than convection.

3. Electric potential is the electric potential energy per unit charge at a point in an electric field. It is a scalar quantity and is measured in volts. Electric potential energy, on the other hand, is the energy that a charged particle possesses due to its position in an electric field. It is a scalar quantity and is measured in joules. If a negative charge moves in the direction of a uniform electric field, it will experience a force in the opposite direction to the field, and its potential energy will decrease.
4. The Yukawa force, also known as the nuclear force, is a strong attractive force between nucleons (protons and neutrons) that holds the atomic nucleus together. It is mediated by the exchange of mesons, which are subatomic particles with integer spin. The range of the Yukawa force is very short, on the order of 10^{-15} meters, because the exchange particles have a relatively large mass.
5. A thermometer is a device used to measure temperature. Internal energy is the total energy of a system due to the motion and interactions of its particles. Heat is the energy that is transferred between two bodies at different temperatures when they are brought into thermal contact with each other.
6. The pressure at the center of the sun is estimated to be about 250 billion atmospheres. However, the pressure decreases rapidly as you move outwards from the center, reaching about 1 atmosphere at the visible surface of the sun, known as the photosphere.