January 2021 | February 2021 | March 2021

December

WEEK 51

Monday 14

8.00 am

8.30 I-HASEEB-ULLAH

9.00 ID# 16314

9.30

10.00 APPLIED PHYSICS

10.30 PAPER SUMMER

11.00 Dr. SHAHID LATIF SAIB

11.30

Noon

12.30

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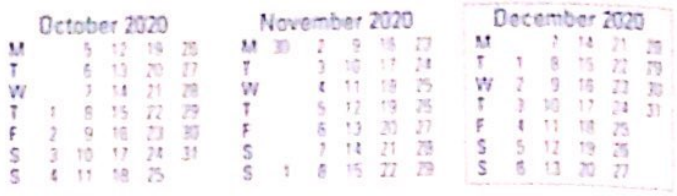

15 Tuesday 350/016

8.00 am

8.30 Question 1 :-

9.00 Part a :-

What is meant by the term work done ? Derive equations for positive 9.30 and negative work done ?

10.00

Answer :-

10.30

The word "work" means almost 11.00 physical or mental activity but in physics it has only one meaning. 11.30

Work is said to be done only Noon when a force produce motion.

12.30 The work done by force on a body is defined as the product of 1.00 the force and the distance moved by the body in the direction of 1.30 the force.

2.00 Work is a scalar quantity.

2.30 Mathematicall ~~form~~ :-

3.00 Work = Force x Distance

3.30 $W = FS$

$\boxed{W = FS}$

4.00

Example :-

4.30 Walking up stairs, Lifting heavy object, pulling a sledge and pushing 5.00

6.00 pm

a shopping trolley. Whenever work is done, energy is transfered from one place to another.

Positive Work:

When force and displacement are in the same direction, the work performed on an object is said to be positive work.

OR

The type of work in which the force has a component in the same direction as the displacement is called positive work.

Example:

When a body move on the horizental surface, force and displacement act in the forword path. The work is done in this case known as positive work.

equation:

$$W = FS \cos\theta$$

$$F = w = mg$$

$$S = h$$

$$\theta = 0^\circ$$

$$w = mgh \cos 0^\circ$$

$$\cos 0^\circ = 1$$

$$w = mgh\,(1)$$

$$\boxed{w = mgh}$$

17 Thursday 352/014

8.00 am

Negative Work:-

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Negative work is performed if the displacement is opposite to the direction of the force applied.

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Example:-

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work was done the gravity on a socket going perpendicular upwards.

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Equation:-

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$W = FS\cos\theta$

$\theta = 180°$

1.00

$W = FS\cos 180°$

1.30

$\cos 180 = -1$

$W = FS(-1)$

2.00

$W = -FS$

2.30

$\boxed{W = -FS}$

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4.30

00 pm

8.00 am

8.30 **Question 2 :-**
part a :-

9.00 State and mathematically explain Columb law. Apply Columb law to discuss role of the

9.30 material medium in between the

10.00 charges?.

10.30

Statement :-

11.00 Columb law state that electrical

11.30 force b/w two charged objects is directly proportional to the product of the

Noon quantity of charge inversely proportional of the object and

12.30 the separate distance b/w the two objects.

1.00 This law state that two stationary point q_1 and q_2 repel or attract each

1.30 other with a force..

2.00 (a) It is directly proportional to the product $q_1 q_2$ of the magnitude of the charges.

2.30 (b) It is inversely proportional to the square

3.00 distance r b/w them

3.30 (c) Act along the line joining the charge.

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19 Saturday 354/012

8.00 am

Mathematicall form:-

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Let q_1 and q_2 be two Stationary point charges Separate by distance (r). According to the columb's law the force (F) b/w two Stationary point charges is given by:

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$$F_e \propto q_1 q_2$$

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$$F_e \propto \frac{1}{r^2}$$

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$$F_e \propto \frac{q_1 q_2}{r^2}$$

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Therefore

$$F_e = \text{Constant} \frac{q_1 q_2}{r^2}$$

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$$\boxed{F_e = k \frac{q_1 q_2}{r^2}}$$

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1.30

2.00

Columbs Law in material mediums:-

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A material in which all electrons are tightly bounded to the nuclei of the atoms is called a dielectric (or insulator)

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3.30

Glass, plastic, mica, oil are examples of dielectrics.

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4.30

when the medium surrandy the charges is not a vaccum but it is a non-conducting or dielectric medium then the columbs force b|w the charges is reduced. The effective of Columb force is known as:

$$\bar{F}_e = \frac{1}{4\pi\epsilon} \frac{q_1 q_2}{r^2} \hat{r}$$

The quantity (ϵ) is called the permitivity of the material. A material medium with high permitivity reduces the force b|w the charges are compared with the vaccum value. For Air, $\epsilon_{air} = \epsilon_e$.

Question 4
= part a =

Give electrical classification of Solid, give three example for each type of material?

Answer:-

The fundamental electrical property of Solid is it ability to Conduct current. the requirement of electrical conduction is a presence of free charges with in the material on the basis of electrical properties

21 Monday 356/010

8.00 am

Solids can be classified as conductor. Semi Conductor and insulator.

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The electrical properties of solids vary largely based on their composition and chemical structure. They are decided into three groups.

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10.00

1. Conductor.
2. Semiconductor.
3. insulators

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Conductors:-

A substance which offer Low resistance to the flow of electric current is called Conductor.

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Current pass easily through conductors. They contain free electrons. Metals such as silver, copper and aluminium are very good conductor. the Conductivity of the conductors is of the order of 10^7 mho/m $(\Omega-m)^{-1}$. Then electrical resistivity is of the order of 10^{-7} ohm – meter $(\Omega-m)$

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Example:-

The human body and the earth are good conductor of electricity. Some of the common conductor examples include metal such as

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1. Copper.
2. Gold
3. Iron.

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8.00 am

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Insulators:-

A substance which (at a particular does not allow the flow of electrons (current) through them is Called insulator.

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They are very poor conductor of electricity charges are bound no free electrons in insulator. Dry wood, diamond, glass, mica and polythene and most of the non-metal are good insulators. The conductivity of the insulator is very low ranging b/w 10^{-10} $(\Omega\text{-m})^{-1}$ to 10^{-20} $(\Omega\text{-m})^{-1}$. Their electrical resistivity is of the other of 10^{10} $(\Omega\text{-m})$ to 10^{20} $(\Omega\text{-m})$.

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Example:-

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Some of the common isulator ~~are given~~ are:-

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2.00 ① plastic

2.30 ② wood

3.00 ③ Glass.

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23 Wednesday 358/008

8.00 am

Semi Conductor:-

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The material which have their Conductivity in b/w those of Conductors and insulator are called semiconductor.

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Forexample:- gramanium and Silicon are important Semi conductor. Their Conductivity

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lie b/w insulator and conductor. They have conductivity in the range of

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$10^{-4}\ (\Omega\text{-m})^{-1}$ to $10^{-6}\ (\Omega\text{-m})^{-1}$

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Example:-

Semi Conductor are Silicon, germanium, gallium arsenide are element near the So called "metalloid staircase" on the

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periodic table. After Sillicon, gallium arsenide is the second most common semiConductor and

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is used to laser diodes, Solar cells, microwave frequency integrated circuit.

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Question 4

2.00

part b:-

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Distinguish b/w intrinsic and extrinsic Semi Conductor. Give each material used for these

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purposes?

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Answer:-

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Intrinsic SemiConductor:-

The pure form of

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the Semi Conductor is known as the intrinsic Semi Conductor.

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6.00 pm

8.00 am

The Conductivity of the intrinsic Semiconductor become zero at room temperature.

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9.00

Example :- include Silicon and germanium.

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A direct band gap instrinstic Semiconductor is one where the maximum energy of the velence band occurs at the same as the minimum energy of the Conduct band. example includ gillium arsenide.

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11.00

Extrinsic Semi Conductor:-

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The Semi Conductor in which intentially impurities is added for making it Conductive is known as extrinsic Semi Conductor.

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The extrinsic is very Little conductive at room temperature.

1.00

1.30

Example :-

To obtain desire Conduction properties a small amount of impurity is introduced to the pure-semi Conductor. In practice pure Ge and Si crystals are dopped with minute amount of selected impurities. The dopped Semiconductor are called extransic Semi Conductor.

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25 Friday 360/006

Christmas Day

Question 1
part b :-

Given that :-

Weight of the object = $W = mg = 32\ N$

Applied force $F = 45$

Distance $= S = 50\ m$

Angel b/w the direction of the force and direction of displacement $= 45°$

To find Work done $= w = ?$

Solution :-

Using formula / equation

$W = FS\cos\theta$

$W = (45\ N)(50\ m)(\cos 45°)$

$\cos 45° = 0.526$

$W = (45\ N)(50\ m)(0.526)$

$\boxed{W = 1183.5\ Nm}$

8.00 am

Question 3:-

part b:-

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9.00

What is the force per meter length on a wire carring 1.2 A current in a 0.75T magnetic field.

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Given:-

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Current flowing through the wire = I = 1.2 A

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Strength of the magnetic field = B = 0.75T

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To find, Force per meter Length = $\frac{F}{L}$ = ?

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Solution

1.00

The magnitude of the force perunit meter is =

1.30

$$\frac{F}{L} = IB$$

2.00

Putting values in formula.

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$$\frac{F}{L} = (1.2\ A)(0.75T)$$

3.00

3.30

$$\frac{F}{L} = 0.9\ ANA^{-1}m^{-1}$$

4.00

4.30

$$\frac{F}{L} = 0.9\ Nm^{-1}$$

5.00

$$\boxed{F/L = 0.9\ N/m}$$

6.00 pm

(B)

27 Sunday 362/004

8.00 am

Question 5:

~~Part a:~~

What is photo electrical effect? How it is experimetaly studied? Where are the major features of photoelectric effect. decribe by given example?

Answer:-

Photo electrical effect:- The phenomenon in which electrons are emitted from a metal force. when it is illuminated with a high frequency of electric meagnetic rediation is called photoelectric effect and the process is called photoelectric emission. The electrons emitted in this process are called photoelectrons and the current produced due to these photos of electrons is called photoelectric current.

Explanation:

[redacted] application affect was first observed by Hertz in 1887. Atypical arrangment for the Study of photoelectric effect.

Light form a source shine on a photosensitive cathode plate C. which emits electrons another plate B at a positive & potential with respect to the cathod acts as a collecter of photelectrons ejected from the cathode.

The two plates are sealed in a evacuated tube are an connected externally to a variable Voltage Source and sensitive galvanometer or an ammeter. These photo electrons move across the tube to the positive Collector and carry current through the tube when the light is switched off then the current through the circuit will stop.

Photoelectric Current is found to depend on two factors:-

(1) The intensity of the incident light (Note first depend on intensity and frequency).

(2) The frequency of the light.

Experimental result of photoelectric effect:-

(i) Threshold frequency:-

The minimum frequency required to initiate photoelectrical effect is called threshold frequency or cut off frequency.

(ii) Instantaneous effect:-

Photoelectric effect is a instantaneous process. No matter how weak the beam of light is, if its frequency $f > f_0$ electrons are emitted at the instant the light strike the Cathode; the photo electric effect occurs at once to time delay.

29 Tuesday 364/002

8.00 am

~~(iii) Photo electric~~

8.30

(ii) dependence of Light intensity:-

9.00

With $f > f_0$ The number of photoelectrons emitted from the cathode is directly proportional to the intensity of light beam. The number of photoelectrons ejected depends upon the intensity of the incident light. The maximum kinetic energies of the photo electrons depend on the intensity of the light, it depends of the frequency of the incident light.

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Noon (iv) Maximum kinetic energy:-

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The maximum kinetic energy of the ejected electrons is determined by reversing the battery in the circuit and making the cathode C negative with respect to the collector B. As C is made more and more negative the current rapidly decreases and stops at some definite retarding potential V_0 which is called the stopping potential (stopping voltage) detected by the voltmeter.

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The meximum Kinectic energy lost by electron of charge (e) is moving up the retarding potential (V_0) is given by.

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$$(KE)_{max} = \frac{1}{2} m v^2 = eV_0 \quad -(A)$$

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5.00

Rizal Day (Philippines)

8.00 am — 365/001 Wednesday 30

(v) The maximum kinectic energy is measured for light of different frequencies. The graph of ~~the light~~ KE_{max} against the frequency of the light is found to be straight line.

The equation of Line is

$$(KE)_{max} = eV_o = hf - hf_o$$

$$(KE)_{max} = h(f - f_o) \quad \text{— (B)}$$

where h is the slope of the line and f_o is the threshold frequency.

~~Noon~~

Question 2
part b:-

~~What is~~ Explain using diagrams and mathematical expression Concept of electric flux?

Answer:-

Electric flux:-

The electric flux is define as the scalor or dot product of electric field intensity $\vec{E}$ and the plane surface area $\vec{A}$.

Mathematicall forms Electric flux, $\Phi = \vec{E} \cdot \vec{A}$

$$\Phi = EA\cos\theta$$

8.00 am

Where θ is the angle b/w the direction of electric field intensity $\vec{E}$ and the direction of vector area $\vec{A}$. Physically electric flux represents the number of Lines of electric force passing normally (perpendicularly) through a surface.

Condition of maximum flux:-

When the surface are is perpendecular to the electric field intensity. Then $\vec{E}$ will the parallel to $\vec{A}$. So that $\theta = 0^\circ$ under this Condition flux passing through the surface is maximum In other words under this Condition maximum number of Lines of force will normally pass through the surface.

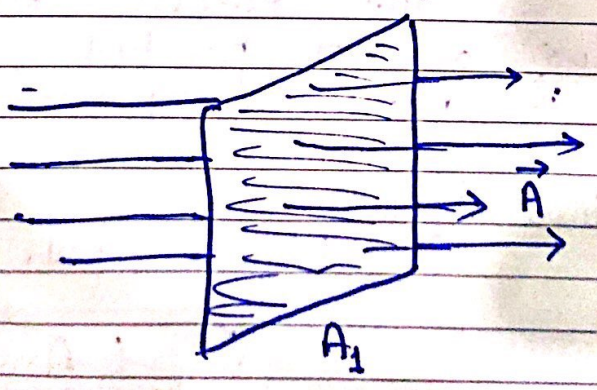
Magnitude of electric flux

$\phi = EA \cos\theta \quad (\theta = 0^\circ)$

$\phi = EA \cos 0$

$(\cos 0 = 1)$

$\boxed{\phi = EA}$



Condition of minimum flux:-

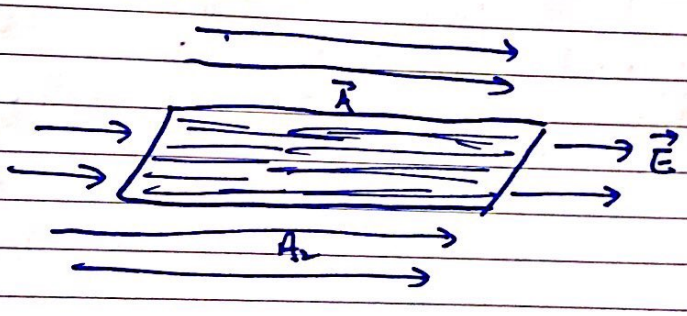
When the surface area is parallel to the electric field intesity. Then $\vec{E}$ will be perpendicularly to $\vec{A}$, So that $\theta = 90^\circ$ under this condition flux passing through the surface of minimum. In other word this condition no line of force will pass through the surface.

Magnitude of electric flux:-

$$\Phi = EA \cos\theta \qquad \theta = 90^\circ$$

$$\Phi = EA \cos 90^\circ \qquad \cos 90^\circ = 0$$

$$\boxed{\Phi = 0}$$



Question 3 :-

part = A :-

Describe the existance of megnetic force on electric current carring Conductor in a magnetic field. Obtain equation for the force.

Answer:

When an electrical wire is exposed to magnet, the current in that wire will experience a force the result of a magnet field.

The force (F) a magnetic field (B) exerts on a individual charge. (q) travelling at drift velocity V_d is

$$F = qv_dB \sin\theta$$

In this instance θ represents the angle b/w the magnetic field and wire (magnetic force is typhically calculated as a cross product) If B is constant throughout wire and elsewhere, then for a wire with N charge carriers in it total magnetic force on the wire is

$$F = IlB \sin\theta$$

The direction of the magnetic force can be determined using the right hand rule, demonstrated in the thumb is pointing in the direction of the current, with the four other figures parallel to the magnetic field cuting the figures reveals the direction of magnetic force.