**NEB - GRADE 12**
**2081 (2024)**

# Physics(New Course)

**(For the regular and grade increment general stream students whose first two digits of registration number starts from 78,79 and 80)**

**Attempt all the questions.**

## Group A

**Rewrite the correct options of each questions in your answer sheet. [11*1=11]**

**1** If the meniscus of a liquid kept in a glass tube is plane then what will be the value of angle of contact?

(A) Zero (B)less than 90 degree (C) greater than 90 degree (D)equal to 90 degree

**Answer** (D) equal to 90 degree

**2** The period of oscillation of mass M suspended from a spring is 2 second.What will be the period if mass is equal to 4M?

(A) 1 sec (B) 2 sec (C) 4 sec (D) 8 sec

**Answer:** (C) 4 sec

**3** A disc of moment of inertia 1 is rotataing about an axis passing through its centre and perpendicular to its plane.if a small wax of mass m is dropped at distance r from the axis of rotation then what will be the new moment inertia of the disc?

(A) I (B) $I-mr^2$ (C) $I+mr^2$ (D) $I/mr^2$

**Answer:** (C) $I+mr^2$

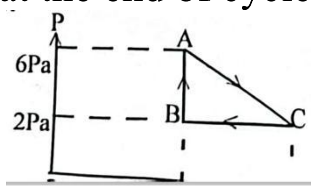
**4** An ideal heat engine working between temperatures T1 and T2 has efficiency η .if both the temperature are raised by 50K each, the new efficiency of engine will be

(A) η (B)more than η (C) less than η

(D) depends upon the nature of working substance

**Answer:** (B) more than η

**5** . An ideal gas is taken through series of changes represented in diagram.The workdone by the gas at the end of cycle is




(A)$6*10^{-6}$J B $12*10^{-6}$J

(C)$3*10^{-6}$J D 6J

**Answer:** (A) $6\times10^{-6}$J

**6 .**In which of the following medium ,the velocity of sound is highest?

A Vacuum B Water C Hydrogen D Steel

**Answer**: (D) Steel

**7.** Critical angle for a glass is 42 degree.What will be the Polarizing angle for it?

**A** $30^0$ B $45^0$ C $56^0$ D $65^0$

**Answer:** (C) 56°

8. Study the following list of thermoelectric series ans answer the question given below.

**Sb, Fe, Zn, Pb, Mn, Cu, Bi**

Which the following combination would give the least emf?

(A) Sb and Bi (B)Fe and Cu (C) Sb and Cu

(D) Zn and Mn

**Answer:** (D) Zn and Mn

**9** Which of the followings can be explained by the area of the hysteresis curve ?

(A) Retentivity B loss of energy per cycle

C coercivity   D Curies temperature

**Answer:** (B) loss of energy per cycle

**10** A charge of 2 coulomb is moving with velocity of 0.5 $ms^{-1}$ at an angle of $30^0$ in an magnetic field of 4T.What will be the magnetic force experienced by the charge ?

A 1N  B 2N  C 4N  D 0.5N

**Answer:** (B) 2 N

**11** Which of the earthquakes wave is first recoreded on the sesimograph?

A S-waves    B P-waves

C Love waves    D Rayleigh waves

**Answer:** (B) P-waves

## Group B

**Short answer Questions.** **8*5=40**

12. a) Define moment of inertia [1]

**Answer: Moment of inertia** is the sum of the products of mass elements and the square of their distances from the axis of rotation.

b) State principle of conservation of angular momentum with one example [1+1]

**Answer:Principle of conservation of angular momentum:**

The total angular momentum of a system remains constant if no external torque acts on it.

## Example:

When you spin on a chair and pull your arms close to your body, you spin faster. This happens because your angular momentum stays the same.

c)A wheel starts from rest and accelerates with constant

Angular acceleration to an angular velocity of 8 revolutions per 5 seconds.Calculate :

i) Angular acceleration and

ii) Angle which the wheel has rotated at the end of 3 sec. [2]

## Answer:

Step 1: Convert angular velocity to rad/s

1 revolution = $2\pi$ radians

$$\omega = \frac{8 \text{ revolutions}}{5\text{s}} = \frac{8\times 2\pi \text{ radians}}{5\text{s}} = \frac{16\pi}{5} \text{ rad/s}$$

**i) Calculate angular acceleration α**

Using formula:

$$\omega = \omega^0 + \alpha t$$

Since $\omega^0 = 0$

$$\alpha = \frac{\omega}{t} = \frac{16\pi/5}{5} = \frac{16\pi}{25} \approx 2.01 \text{ rad/s}^2$$

**ii) Calculate angle θ rotated in 3 seconds**

## Using:

$$\theta = \omega^0 t + \frac{1}{2}\alpha t^2$$

Since $\omega^0 = 0$

$$\theta = \frac{1}{2} \times \frac{16\pi}{25} \times (3)^2 = \frac{1}{2} \times \frac{16\pi}{25} \times 9 = \frac{72\pi}{25} \approx 9.05 \text{ radians}$$

**Final answers:**

$\alpha \approx 2.01 \text{ rad/s}^2$

$\theta \approx 9.05$ radians

OR

a)Define simple harmonic motion

Answer:**Simple Harmonic Motion (SHM):**
It is a type of periodic motion in which the restoring force is directly proportional to the displacement and acts in the opposite direction.

b) Obtain an expression for frequency of oscillation of vertical mass spring system[2]

**Answer:** When a mass m is attached to a vertical spring with spring constant k, it oscillates with simple harmonic motion.

The restoring force is:

$F = -kx$

Using Newton's second law:

$$F = m \frac{d^2x}{dt^2}$$

So,

$$m \frac{d^2x}{dt^2} = -kx \Rightarrow \frac{d^2x}{dt^2} + \frac{k}{m} x = 0$$

This is the equation of SHM with angular frequency:

$$\omega = \sqrt{\frac{k}{m}}$$

Frequency is given by:

$$F = \frac{\omega}{2\pi} = \frac{1}{2\pi} \sqrt{\frac{k}{m}}$$

**∴ Frequency of oscillation is** $f = \frac{1}{2\pi}\sqrt{\frac{k}{m}}$

a) A simple pendulum of effective length 4 m swings with an amplitude of 0.2m.Compute the velocity of pendulum at its lowest point [$g=9.8ms^{-2}$]

**Answer: Given:**

Effective length, l=4 ml

Amplitude, A=0.2 m

Acceleration due to gravity, $g=9.8\ m/s^2$

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At the lowest point, the pendulum has **maximum velocity**, which is given by:

$$V_{max} = \omega A$$

Where ω is the angular velocity:

$$\omega = \sqrt{\frac{g}{l}} = \sqrt{\frac{9.8}{4}} = \sqrt{2.45} \approx 1.565\ rad/s$$

Now,

$V_{max} = \omega$ **A**$=1.565\times0.2 \quad \approx 0.313$ m/s

**∴ Velocity of the pendulum at its lowest point is approximately** 0.313 m/s

13. Define capillarity with two suitable examples [2]

**Answer: Capillarity:**
Capillarity is the phenomenon of the rise or fall of a liquid in a narrow tube due to surface tension.

**Examples:**

Water rises in a thin glass tube when dipped into it.

Oil rises in the wick of a lamp.

b) Water flows steadily through a horizontal pipe of non-uniform cross-section.if the pressure of water is $4*10^4$ $Nm^{-2}$ at a point where the velocity of the flow is $2ms^{-1}$ cross section is $0.002ms^{2}$·what is the pressure at a point where cross-section reduces to $0.01m^{2}$?

**Answer:** To find the pressure at the second point in a horizontal pipe with varying cross-section, we will use:

**1. Equation of Continuity:**

$A_1 v_1 = A_2 v_2$

## 2. Bernoulli's Equation (for horizontal flow):

$$P_1 + \frac{1}{2}\rho \mathbf{v}^2{}_1 \quad = P^2 \quad + \quad \frac{1}{2}\rho \mathbf{v}^2{}_2$$

**Given:**

$P1 = 4\times10^4\ N/m^2$

$v1 = 2m/s$

$A1 = 0.002\ m^2$

$A2 = 0.01\ m^2$

$\rho = 1000\ kg/m^3$(density of water)

Step 1: Use continuity equation to find $\mathbf{V}_2$ :

$$A_1 v_1 = A_2 v_2 \quad = v_2 = \frac{A1\ v1}{A2} = \frac{0.002*2}{0.01} = 0.4\ m/s$$

Step 2: Use Bernoulli's equation to find $P_2$:

$$P_1 + \frac{1}{2}\rho \mathbf{v}^2{}_1 \quad = P^2 \quad + \quad \frac{1}{2}\rho \mathbf{v}^2{}_2$$

**Final Answer:**

$P_2$=41920 N/$m^2$

14 a)Adiabatic process is the thermodynamic process in which the heat contained in a gaseous system remains constant

**Adiabatic process:**
An adiabatic process is a thermodynamic process in which **no heat is exchanged** between the system and its surroundings. That is,

$Q = 0$

In this process, any change in internal energy is due to the work done **on or by** the system, not due to heat transfer.

i) Adiabatic curve is much steeper than an isothermal curve,why?

**Answer:** An adiabatic curve is steeper than an isothermal curve because:

In an **isothermal process**, temperature remains constant, so the gas can expand more easily as it gains/loses heat.

In an **adiabatic process**, no heat is supplied, so expansion or compression must occur **at the expense of internal energy**, causing faster drop or rise in pressure. Thus, **pressure falls more rapidly** with volume in adiabatic expansion, making the curve steeper.

ii) Adiabatic curve is much steeper than an isothermal curve,why?

For an adiabatic process,

$$PV^{\gamma} = \text{constant}$$

The work done is:

$$W = \int_{V1}^{V2} P\, dV$$

Using $P = \frac{C}{V\gamma}$

$$W = \int_{V1}^{V2} \frac{c}{V\gamma}\, dV = C \int_{V1}^{V2} \frac{C}{V-\gamma}\, dV$$

Now, substitute $C = P_1 V_1^{\gamma}$, the work becomes:

$$W = \frac{P_2 V_2 - P_1 V_1}{\gamma - 1}$$

**b)** A refrigeator has a coefficient or performance of 1.95.In each cycle it absorbs $3*10^4$ of heat from cold reservoir.How much heat is discarded to high temperature during each cycle?

**Answer:**

Coefficient of performance, COP=1.95

Heat absorbed from cold reservoir, $QC = 3\times10^4$ J

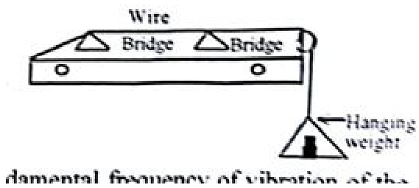
Find heat discarded to high temperature reservoir: $Q_H$

Now,

$Q_H = Q_C + W = 3\times10^4 + 15384.6 = 45384.6$ J

Heat discarded: 45384.6 J

15 a)Does the frequency of fundamnetal vibration of wire depend on the value of hanging weight?Justify




**Answer:Yes**, the frequency of fundamental vibration of a wire **depends on the hanging weight** because the weight creates **tension** in the wire, and frequency is directly proportional to the square root of the tension:

$f = \frac{1}{2L}\sqrt{\frac{T}{\mu}}$ where $T = Mg$

b) What will be the value of fundamnetal frequency of vibaration of the wire if the hanging weight is immersed in a liquid of upthrust U?

**Answer: If the hanging weight is immersed in a liquid with upthrust U, the fundamental frequency becomes:**

$$F = \frac{1}{2L}\sqrt{\frac{Mg-U}{\mu}}$$

Because the effective tension decreases due to upthrust, the frequency also decreases.

**c)** Describe the different modes of vibration in a closed organ pipe [3]

**Answer: Modes of Vibration in a Closed Organ Pipe:**

1 **Fundamental Mode (1st harmonic):**

- One end is closed, the other is open
- A **node** forms at the closed end and an **antinode** at the open end.
- The pipe length is $\frac{1}{4}$ of the wavelength.
- Frequency:

$$f_1 = \frac{v}{4L}$$

**2 First Overtone (3rd harmonic):**

- Two nodes and two antinodes are formed.

. The pipe length is $\frac{3}{4}$ of the wavelength.

. Frequency:

$$F_3 = \frac{3v}{4L}$$

## 3 Second Overtone (5th harmonic):

**.** Three nodes and three antinodes are formed.

. The pipe length is $\frac{5}{4}$ of the wavelength.

. Frequency:

$$F_5 = \frac{5v}{4L}$$

**Only odd-numbered harmonics** (1st, 3rd, 5th...) are produced in a closed organ pipe.

**16 a)** Define potential gradient.Express it in terms of specific resistance of the potentiometer wire

## Answer:

**Potential Gradient:**

- It is the **change of voltage per unit length** along a wire.
- Formula:

$$\text{Potential gradient} = \frac{Voltage}{Length}$$

**Expression using specific resistance:**

. If the wire has current I, resistivity ρ, and area A, then

$$\text{Potential gradient} = \frac{I * \rho}{A}$$

c) An unknown resistance $R_1$ is connected in series with resistance 10.This combination is connected to one of the gaps of a meter bridge ,while another resistance $R_2$ is connected to next gap. The balance point is obtained at 50 cm.Now,When 10 resistance is removed,the balance point is 40 cm.Find the value of $R_1$

**Answer:** Given:

. $R_1$ (unknown resistance) connected **in series** with 10 Ω

.This series combination is connected to one gap of the meter bridge

. $R_2$ connected to the other gap

. Balance point $l_1$=50 cm

. When 10 Ω is removed, balance point $l_2$=40 cm

**Step 1: Use the meter bridge formula**

At balance point, ratio of resistances equals ratio of lengths:

$$\frac{R}{R2} = \frac{l}{100-l}$$

Step 2: First case (with R1 +10 Ω):

$$\frac{R1+10}{R2} = \frac{50}{100-50} = 1$$

So,

$$R2 = R1 + 10 \text{ ———————— } (1)$$

**Step 3: Second case (without 10 Ω):**

Now, only $R_1$ is connected, and balance point is 40 cm:

$$\frac{R1}{R2} = \frac{40}{100-40} = \frac{2}{3}$$

So,

$$R_1 = \frac{2}{3} R_2 \text{ ———————— } (2)$$

**Step 4: Solve equations (1) and (2):**

From (1), $R_2$=R1+10R

Substitute into (2):

$$R_1 = \frac{2}{3}(R_1+10)$$

Multiply both sides by 3:

$$3R_1 = 2R_1 + 20$$

$$R_1 = 20\Omega$$

18 Define depletion layer and potential barrier in P-N junction diode? [2]

**Answer:**

Depletion Layer:

· When a P-N junction is formed, electrons from the **N-side** and holes from the **P-side** move and recombine near the junction.

. This creates a region with **no free charge carriers**, called the **depletion layer**.

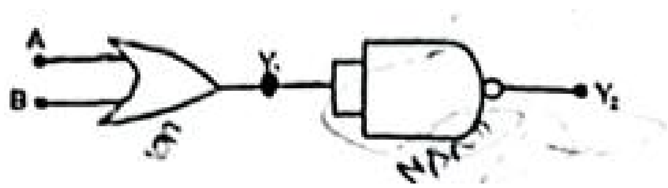
Potential Barrier:

. Due to recombination, **positive ions** are left on the N-side and **negative ions** on the P-side of the junction.

. This creates an electric field that **opposes further movement** of charges.

.The voltage needed to overcome this field is called the **potential barrier**.

b)For the digital circuit given below write the truth table showing the outputs $Y_1$ AND $Y_2$ for all possible A and B




**Answer:**

Truth Table

| A | B | $Y_1$ =A OR B | $Y_2$ = A AND B |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 0 |
| 1 | 0 | 1 | 0 |
| 1 | 1 | 1 | 1 |

c) Identify ,which gas is obtained from the above combination of gates [1]

**Answer:**

**Argon**

Because the combination of **OR** and **AND** gates sounds like:
**OR + AND = "ARGON"** (a noble gas).

19 a)Define ionization potential

**Answer:**

**Ionization Potential:**

It is the **minimum energy** required to **remove one electron** from a **neutral isolated gaseous atom**.

b) The total energy of an electron in the first excited state of hydrogen atom is about -3.4 eV.

**Answer:**

In hydrogen atom:

Potential Energy (P.E) $= 2 \times$ Total Energy

(P. E) $=2\times(-3.4)=-6.8$ eV

iii) If the electron in the first excited state jumps to the ground state of hydrogen atom then calculates the wave length of the emitted radiation. Value of Rydbergs Constant, $R = 1.09^{7} * 10^{-1}$

**Answer:**

Energy of emitted radiation:

$$E = E2 - E1 = (-3.4) - (-13.6) = 10.2\text{eV}$$

Convert to joules:

$$E = 10.2 \times 1.6 \times 10^{-19} = 1.632 \times 10^{-18}\ \text{J}$$

Use the formula:

$$\lambda = \frac{6.63 \times 10^{-34} \times 3 \times 10^{8}}{1.632 * 10^{-18}} = 1.217 \times 10^{-7}\text{m}$$

$\lambda = 121.7$nm

**Final Answers:**

**i)** Potential energy = **–6.8 eV**

**ii)** Wavelength of emitted radiation = **121.7 nm**

20 a) Sound waves are called pressure wave.why?

**Answer:**

Sound waves are called **pressure waves** because they **produce regions of high pressure (compressions)** and **low pressure (rarefactions)** as they **travel through a medium** like air.

b) Define one bel.What is threshold of hearing? [2]

**Answer:**

**One bel:**
One bel is a unit to measure how loud a sound is.
It is the **logarithmic ratio** of a sound's intensity to a standard reference intensity.

**Threshold of hearing:**
It is the **lowest sound** a normal human ear can hear.

Its value is $10^{-12}$ W/m$^2$

c)Derive an expression for apparent frequency heard by a listener while moving towards stationary source of sound.

**Answer:**

**Derivation of Apparent Frequency (Listener Moving Toward Stationary Source):**

Let:

f= actual frequency of sound

f′ = apparent frequency

v = speed of sound in air

$v_L$ = speed of listener (toward the source)

Formula:

$$f' = \frac{v+vL}{v} * f$$

Explanation:

.When the listener moves **towards** the source, the **relative speed increases**.

. So, listener receives **more sound waves per second**, hence frequency increases.

e ) A car is approaching a cliff at a speed of 20 m/s .The driver sounds a whistle of frequency 800 Hz.Calculate The frequency of echo as heard by the car driver.[Velocity of sound in air 350m/s]

**Answer:**

Given:

- Speed of car vL=20 m/s
- Frequency of sound (whistle) f=800 Hz
- Speed of sound v=350 m/s

**Step 1: Frequency heard by the cliff (stationary observer)**

The car (source) is **moving toward** the cliff, so the frequency heard by the cliff is:

$$f_1 = \frac{v}{v-vL} * f$$

$$f_1 = \frac{350}{350-20} *800$$

$$F_1 = 848.48 \text{ Hz}$$

Step 2: Echo is reflected from cliff → back to the moving car (listener)

Now the **cliff becomes the source**, and the **car is the listener moving toward** it.

$$f' = \frac{v+vL}{v} * f_1$$

$$f' = \frac{350+20}{350} * 848.48\text{Hz}$$

Frequency of echo heard by driver is 897Hz

**OR**

a) Does interface of light follow the principle of conservation of energy?Justify

**Answer:**

Yes, the interface of light follows the **principle of conservation of energy**.
When light falls on a surface, the energy is divided into **reflected**, **refracted**, and **absorbed** parts, but the **total energy remains constant**.

b) Obtain the expression for the position of $n^{th}$ order maxima from central bright fringe in Youngs double slit experiment

**Answer:**

The distance of the **nth bright fringe** from the center is:

$$X_n = \frac{n\lambda D}{d}$$

Where:

$X_n$ = position of nth bright fringe

- n = fringe number (1st, 2nd, 3rd...)
- λ= wavelength of light
- D = distance from slits to screen
- d = distance between the two slits

How wide is the central diffraction peak on a screen 3.5 m behind a 0.01 mm slit illuminated 500cm light ?

**Answer:**

**Given:**

**Distance to screen D=3.5 m**

Slit width a = 0.01 mm = $1 \times 10^{-5}$ m

Wavelength λ = 500 nm = $500 \times 10^{-9}$ m

Formula for width of central diffraction peak:

$$\text{Width} = \frac{2\,\lambda\,D}{a}$$

$$\text{Width} = \frac{2 * 500 * 10-9 * 3.5}{1 * 10-5}$$

Width of central diffraction peak is 0.7 m

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d ) State and prove Brewsters Law

**Answer:**

When light falls on a surface at a special angle called **Brewster's angle**, the reflected light is **completely polarized**. At this angle:

$\mu = \tan\theta_B$

Where:

. $\mu$= refractive index of the medium

. $\theta_B$ = Brewster's angle

Simple Proof:

At Brewster's angle, the **reflected and refracted rays are at 90°** to each other.

Using Snell's Law and geometry, we get:

$\mu = \tan\theta_B$

21 a) Derive an expression for emf induced in a rectangular coil rotating in a uniform magnetic field .

**Answer:**

Let,

N = number of turns in the coil

A= area of the coil

B = magnetic field strength

$\theta$= angle between normal to the coil and magnetic field

ω = angular velocity
t= time

1. Magnetic Flux (Φ):

Magnetic flux at time t is:

$$\Phi = NBA\cos(\omega t)$$

Induced EMF (Faraday's Law):

$$\text{EMF (e)} = -\frac{d\Phi}{dt}$$

$$e = -\frac{d}{dt}(NBA\cos(wt)) = NBA\ \omega(\omega t)$$

**Final Expression:**

$$e = NBA\ \omega\sin(\omega t)$$

This is the instantaneous emf.
The **maximum emf** is:

$$E_{max} = NBA\omega$$

b)What are eddy currents ?

**Answer:**

Eddy currents are **circular currents** produced in a conductor when it is placed in a **changing magnetic field**.

These currents flow in loops inside the conductor and cause **heating**.

b)A 50 cm long wire mass 20 gm is suspended horizontally in transverve magnetic field of flux density 0.6T through two springs at two ends ,Calculate the current required to pass through the wire so that there is zero tension in the springs

**Answer:**

**Given:**

Length of wire, l = 50 cm= 0.5 m

Mass of wire, m=20 g=0.02 k

Magnetic field, B=0.6 T

Gravitational acceleration, g=9.8 m/s$^2$

Current III so that tension in springs = 0

For zero tension, the **magnetic force** must **balance** the **weight** of the wire:

$$BIl = mg$$

**Solution:**

$$\mathbf{I} = \frac{mg}{Bl}$$

$$I = \frac{0.02*9.8}{0.6*0.5}$$

I=0.653 A

**OR**

a) What is Seebeek effect?

**Answer:**

The **Seebeck effect** is the phenomenon in which a **voltage (emf)** is produced across two different metals when their **junctions are kept at different temperatures**.

b) How does the thermo-emf produced in a thermo couple vary with the temperature of hot junction,when the cold junction is kept at $0^0$ C

**Answer:**

When the cold junction is kept at **0°C**, the **thermo-emf** first **increases** with the increase in temperature of the **hot junction**.
It reaches a **maximum** at a certain temperature (called **neutral temperature**) and then **decreases** if the temperature is increased further.

1 This variation is **non-linear**.

2 The emf–temperature graph is a **parabola** opening downward.

c) Derive an expression for the magnetic field strength inside a long current carrying solenoid using Amperes law

**Answer:**

n = number of turns per unit length
I= current in the solenoid

B = magnetic field inside the solenoid

**Using Ampere's Law:**

$$\oint \vec{B} \cdot d\vec{l} = \mu_0 I_{enclosed}$$

Take a rectangular Amperian loop inside the solenoid along its axis.

Inside a long solenoid, the magnetic field is uniform and parallel to the axis.

So, for length l of the solenoid:

$$B \cdot l = \mu_0 (n \cdot l \cdot I)$$

$$B = \mu_0 nI$$

**Final Expression:**

$$B = \mu_0 nI$$

**Conclusion:**

The magnetic field inside a long current-carrying solenoid is **uniform** and **directly proportional** to the current and the number of turns per unit length.

d) An alpha particle of mass $6.65*10^{-27}$ kg travels with a speed of $6*10^{6}$ m/s at right angle to the magnetic field of 0.2T.Calculate its accleration

**Answer:**

**Given:**

Mass of alpha particle, $m=6.65\times10^{-27}$

Velocity,v = $6*10^{6}$ m/s

Magnetic field, B = 0.2 T

Charge of alpha particle, $q=2\times1.6\times10^{-19} = 3.2\times10^{-19}$ C

**Formula:**

An alpha particle in a magnetic field experiences a magnetic force

F = qvB (since angle = 90°, sinθ = 1)

This force causes **centripetal acceleration**:

$$F = ma = a = \frac{F}{m} = \frac{qvB}{m}$$

**Substitute values:**

$$a= \frac{3.2*10-19*6*10\ 6*\ 0.2}{6.65*10-27}$$

a= $5.77*10^{13}$ m/$s^2$

22) .In thomsons Method Specific charge of an electron is determined

i) Why is electric field kept perpendicular to the magnetic field in this method ?

**Answer:**

The electric field is kept **perpendicular** to the magnetic field so that **both fields exert opposite and balancing forces** on the moving electrons. This helps in **canceling the deflection** and allows accurate measurement of specific charge $(\frac{e}{m})$

ii) What is the ratio of electric to the magnetic field?

**Answer:**

$$\frac{E}{B} = v$$

Where:

E = electric field strength
B = magnetic field strength
v= velocity of the electron

b) An electron moves in a circular path of radius 20 cm in a uniform maganetic field of $2*10^{-3}$T.Calculate the speed of electron and period of revolution (Mass of electron $=9.1*10^{-33}$ kg)

**Answer:**

**Given:**

Radius r=0.20m

Magnetic field $B = 2\times10^{-3}$ T

Mass of electron $m=9.1\times10^{-31}$ kg

Charge of electron $e=1.6\times10^{-19}$ C

**Formulas:**

**1 . Speed of the electron**

$$V= \frac{eBr}{m}$$

**2. Time Period (T) of revolution**

$$T= \frac{2\pi r}{v}$$

**Step 1: Calculate speed**

$$V = \frac{1.6\times10-19\ C*2\times10-3\ T\ \ *\mathbf{0.2}}{9.1\times10-31}$$

$V= 7.03*10^7$m/s

**Step 2: Calculate time period**

$$T= \frac{2\pi r}{V} = \frac{2\pi*0.2}{7.03*107}$$

$T = 1.79 *10^{-8}$ seconds

**Final Answers:**

Speed of electron is $7.03*10^7$m/s

Period of revolution is $1.79 *10^{-8}$ seconds