European University of Bangladesh

2/4 Gabtoli, Mirpur, Dhaka 1216.

Admit Card

Name of Exam : **Final Exam Summer 2021**
Semester : **Summer 2021**
Student's Name : **Shemol Chandra Roy**
Student's ID : **210122009**
Batch : **18th Batch**
Program : **BSc in Computer Science & Engineering (Diploma)**

Courses in which to appear at:

SL	Course Title	Course Code	Credit
1	Discrete Mathematics [A]	CSE-123	3
2	Introduction to Electrical Engineering [A]	EEE-101	3
3	Physics [A]	PHY-101	3
4	Introduction to Electrical Engineering Sessional [A]	EEE-102	1.5
5	Mathematics-II (Ordinary and Partial Differential Equations) [A]	MTH-103	3
6	Physics Sessional [A]	PHY-102	1.5

S/he is allowed to sit for the above mentioned exam.

[Digitally Signed]

Controller of Examinations (EUB)

Instructions for Examinees:

1. Examinee should come to the examination hall with the Admit Card.
2. No examinee will be allowed to sit in the examination hall outside the seat plan.
3. No bag or book will be allowed in the examination hall.
4. Cell Phone must be kept switched off in the examination hall.
5. No examinee will be allowed to enter the examination hall after expiry of half an hour.
6. No examinee will be allowed to leave the exam hall within the first half an hour after the examination begins.
7. Any examinee adopting unfair means will be brought under disciplinary action including expulsion.
8. Any kind of misbehavior will be considered as a serious offence under the rules of the University.

Developed By: Pipilika Soft Printed: 12/08/2021 Coordinated By: ICT Division, EUB

European University of Bangladesh
2/4 Grabtoli, Mirpur, Dhaka-1216

Final Exam Summer - 2021

Name : Shemol Chandra Roy
ID : 210122009
Program : BSc in computer Science and Engineering
Course Title : Physics
Course Code : PHY - 101
Section : A
Semester and year : 2nd year 1st Semester
Date : 13/08/2021
Total page no : 11

Ans to the question no : 1(a)

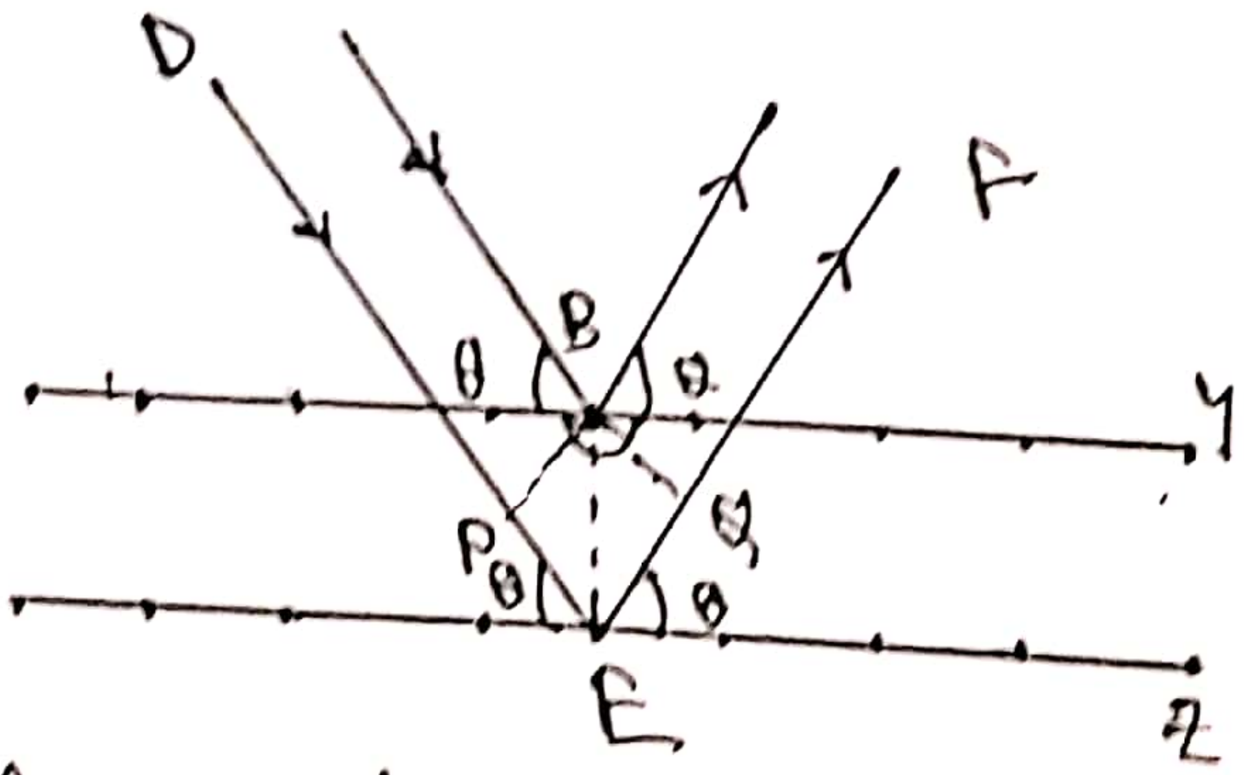
Unit cell and primitive unit cell.

Unit cell	Primitive unit cell
(a) A unit cell is is volume by repeated translation of which the whole crystal can be produced	(a) The unit cell occupying the smallest volume in a given lattice is called the primitive cell.
(b) A unit cell may have more than one lattice point	(b) A primitive cell has only one lattice point.
(c) All unit cell are not primitive cells.	(c) All primitive cells are unit cells.

Ans to the question no: 1(b)

Let us consider a crystal made up of equidistant parallel planes of atoms (fig.1) The distance between two successive planes being d. A beam containing X-ray AB of wavelength of λ is incident upon a crystal at point B at angle θ and reflected by BC direction as shown in figure. Another X-ray incident at second plane and reflected along EF direction.

Draw the normal BP and BQ on the lines DE and EF, respectively the path difference of two rays reflected from adjacent planes



$= PE + EQ$

Now from the right angle triangle $\triangle ABE$ and

$\triangle BEQ$

we have

$PE = BE \sin\theta = d \sin\theta$

$EQ = BE \sin\theta = d \sin\theta$

Therefore path difference $= PE + EQ$

$= d\sin\theta + d\sin\theta$

$= 2d\sin\theta$

The reflected relations will form constructive interference when the path difference is an integral number multiple of wave length λ,

So $2d \sin\theta = n\lambda$ —— ①

where, $n = 1, 2, 3$ ....

Equation is know as Braggs Law of x-ray diffraction.

Ans to the question no : 1(e)

we know,

$$2d\sin\theta = n\lambda$$

$$\text{or, } \lambda = \frac{2d\sin\theta}{n}$$

$$= \frac{2\times 11\times \sin 9^\circ}{1}$$

$$= 3.44\ m$$

Again

$$2d\sin\theta = n\lambda$$

$$\text{OR, } \theta = \sin^{-1}\frac{2\times 3.44}{2\times 11}$$

$$= 18.22^\circ \text{ Ans.}$$

Given,

$n = 1$

$\theta = 9^\circ$

$d = 2m + 009$ [ID]-

$= 11\ m$

$\lambda = ?$

Here,

$n = 2$

Ans to the question no: 2(a)

The substance though which charge on electricity flows on tend to flow is called medium, medium is of three types.

(i) conducton (ii) Semiconducton (iii) Non-conducton or Insulaton.

(i) conducton: The substance though which electricity or charge can flow easily is called conductor, Examples metal eg copper, gold, iron etc, human body acids basess etc. Though these meterials charges can flow easily hence they are conductons.

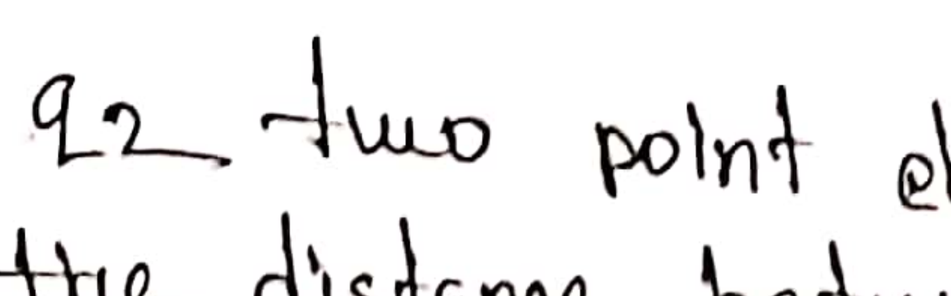
(ii) Semiconducton: The substance though which electricity or charge can flow easily is called conductor, Examples: metal, eg, copper, gold, iron, etc, human body, acids, bases etc.

(iii) Non conductor or Insulator: The substance through which electricity or charge doesnot flow is called non-conductor or Insulator.
Examples: rubber, glass, eboride, waxdry wood etc.

Ans to the question: 2(b)

Let, q_1 and q_2 two point charges and let r be the distance between them. If they assert forces of magnitude F, then according to colomb's law.

$F \propto q_1 q_2$ when q_1 and q_2 are constant



when $F \propto \frac{q_1 q_2}{r^2}$, or, $F = k\frac{q_1 q_2}{r^2}$ ——— (1)

Here is proportionality constant. It's value depends on the nature of the medium and the units of F, q_1, q_2 and r In S.I or m,k.s unit.

$k = \frac{1}{4\pi\epsilon_0}$, where ϵ_0 is the permittivity

In air or vacum, the columb's Law is written as.

$$F = \frac{1}{4\pi\epsilon_0} \frac{q_1 q_2}{r^2} \quad \text{——— (2)}$$

In S.I unit F expressed in columb (C) and distance in meter (m), So the experimen value of ϵ_0 is $8.854 \times 10^{-12} C^2 N^{-1} m^{-2}$

Hence from equation we get, $F = 9 \times 10^9 \frac{q_1 q_2}{r^2}$

Ans to the question – 2(e)

we know,

$$F = \frac{1}{4\pi\epsilon_0} \frac{q_1 q_2}{r^2}$$

$$\text{or, } r^2 = \frac{1}{4\pi\epsilon_0} \cdot \frac{q_1 q_2}{F}$$

$$\text{or } r = \sqrt{\frac{1}{4\pi\epsilon_0} \frac{q_1 q_2}{F}}$$

Given that

$q_1 = q_2 = 5 \times 10^5 C$

$F = 4.5 + 009 N$ [I

$= 13.5 N$

$\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 N m^2 C$

$r = ?$

$$\text{OR, } r = \sqrt{9 \times 10^9 \frac{(5 \times 10^5) \times (5 \times 10^5)}{13.5}}$$

$$\therefore r = 1.290 \times 10^{10} m \quad \text{Ans.}$$

Ans to the question no : 3(a)

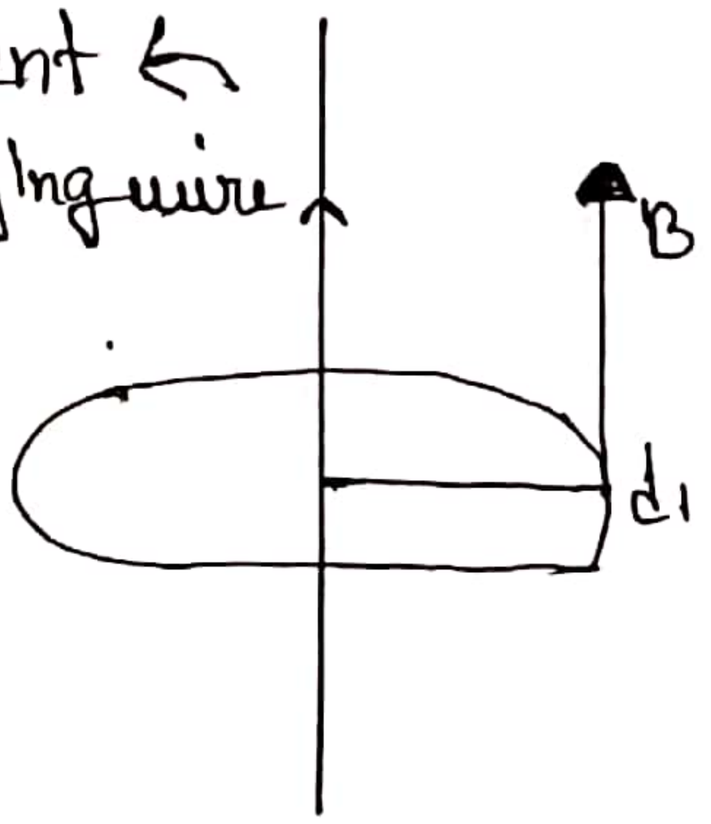
Magnetism: The directional and attractive properties of a magnet is called it magnetism. Magnetism is a form of energy. Magnetism is not the physicall or chemical properties of materials. This is because that when a material is transformed into a magnet, it mass, density, volume or temperature doesnot change.

Ans to the question no : 3(b)

Ampere's Law: Ampere's Law states that the line integral of magnetic field B around a close path in vacuum or air is equal to No times the total current through that closed path, or

Mathematically, $\oint \vec{B}\,\vec{dl} = \mu_0 i$ ——— (1)

let a long straight wire is carrying a current i, we want to find the magnetic field (B) at a point P at a distance r from the wire. The lines of megnetic induction for along straight wire carrying a current i. are concentric circles centered on the wire,



Hence the point P may be regarded to be on a circular loop of radius r surrounding the wire.

Applying Amperenes law, we get

$$\oint \vec{B}.\vec{dl} = \mu_0 i$$

or, $\oint B dl \cos\theta = \mu_0 i$

So, equation reduces to.

$$\oint B dl \cos\theta = \mu_0 i$$

or, $B \oint dl = \mu_0 i$

or $B \times 2\pi r = \mu_0 i$

So $B = \frac{\mu_0 i}{2\pi r}$

Ans to the question no: 3(c)

we know,

$$B = \frac{\mu_0}{2} \frac{ni}{r}$$

Here,
$n = 10$
$r = 0.05\ m$
$i = 6A + 009\ [ID]$
$= 15A$
$\mu_0 = 4\pi \times 10^{-7}$ webe
amp-me

$$\text{or} = \frac{4\pi \times 10^{-7} \times 10 \times 15A}{2 \times 0.05}$$

$B = 1.88 \times 10^{-3}\ Wbm^{-2}$ Ans

$B = 2.$