

# Part-II

## Section-I

Question: 3

(a) Why cells form organelles?  
Discuss mitochondria in human cell.

Answer:

Introduction:

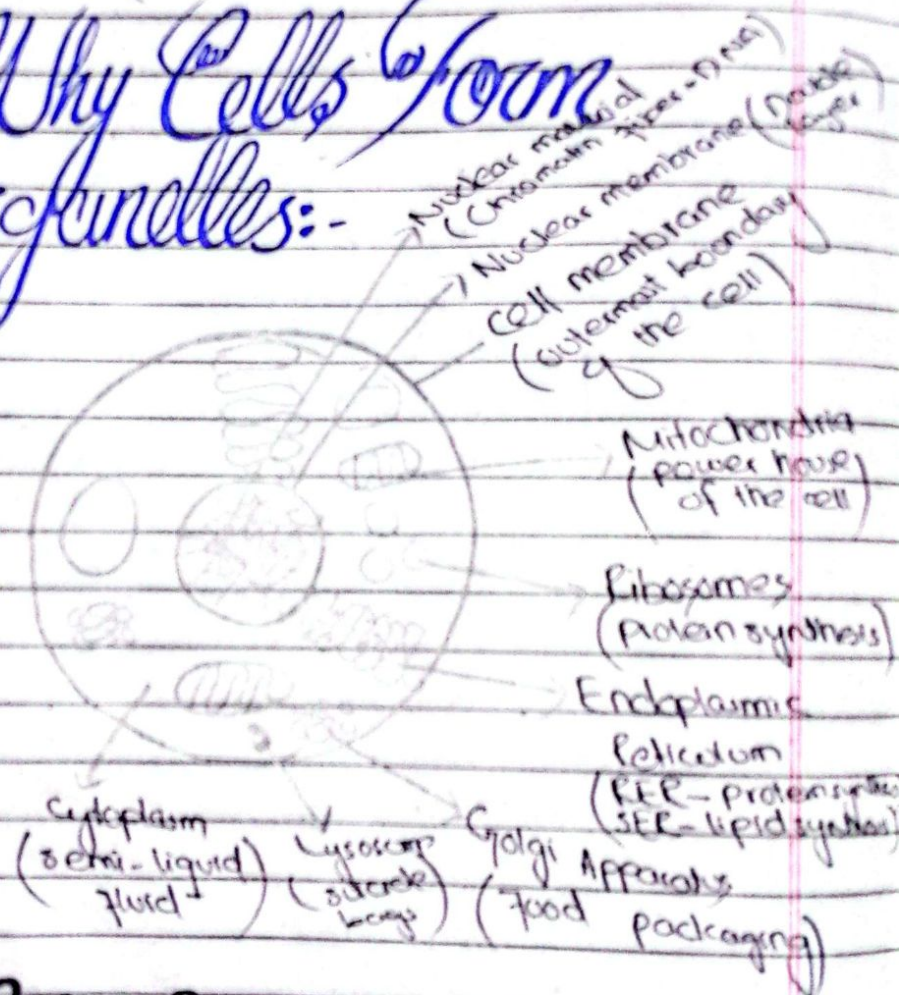
"Cell is the basic structural and functional unit of living organism"  
Schleiden and Schwann

Cell is the structure of living organism that is basic and perform all the functions inside human body. To perform its function smoothly, it forms organelles. Organelles perform functions according to their specificity. Cells consists of different organelles like ribosomes, Golgi bodies, Endoplasmic Reticulum, Lysosomes, Centrioles, mitochondria. Each of organelle is assigned with specific functions.

"Mitochondria is the power house of the cell"

Mitochondria is the organelle that is found inside human cells and it is responsible for generating energy in the form of ATP (Adenosine Triphosphate).

## 2- Why Cells Form Organelles:-



## i- Cells form organelles for division of labor:-

Cells form organelles so function can be divided among different parts and each contribute in proper functioning of cells.

### a) Nucleus:-

Storage of hereditary information in form of Chromosomes (DNA + histone) protein and directing functions of cell.

### b) Ribosomes:-

Ribosomes are tiny granules and used for functioning of protein. They can be of 70s and 80s.

### c) Mitochondria:-

Mitochondria are used for generating energy for the cell during process of respiration.

### d) Endoplasmic Reticulum:

Endoplasmic Reticulum has assigned with function of protein synthesis and lipid synthesis.

### e) Centrioles:-

They function during cell division for the proper separation of chromatids.

### f) Golgi Apparatus:-

Golgi apparatus consists of vacuoles, vesicles and cisternae and is used for packaging and storage of food.

**ii- Cells form organelles for smooth functioning**

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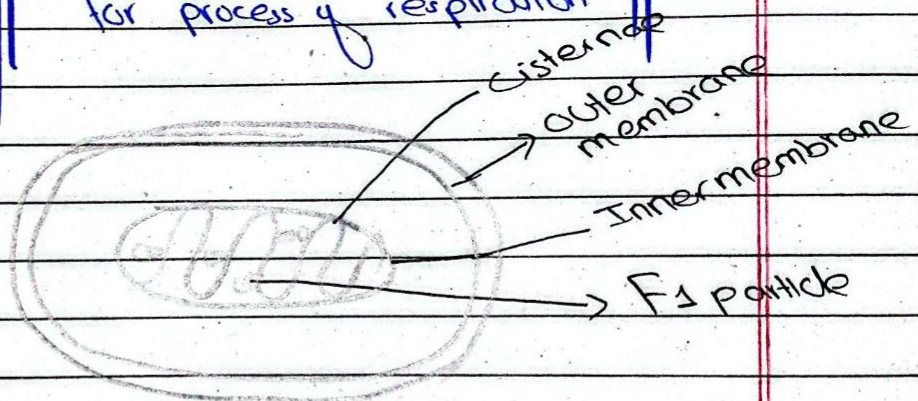
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of each and every task:-

cells form organelles, so that functioning of cell was smoothly, without any interference and work properly.

### 3-Mitochondria:-

Mitochondria is the organelle consists of double layer and consists its own DNA and has F<sub>1</sub> particles for process of respiration?



#### 3(a) Mitochondria Structure:-

i- Consists of double membrane.

Mitochondria consists of double membrane. Outer membrane is smooth, while inner form folding.

ii- Inner membrane of mitochondria and cristae.

Inner membrane of mitochondria form foldings.

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known as cisternae.

iii- F<sub>1</sub> particles in cisternae:-

In mitochondria, knob like particles are present which is known as F<sub>1</sub> particles.

iv- Own DNA of mitochondria:-

Mitochondria possess its own DNA.

3(b) Functions of Mitochondria:-

i- Power house of the cell:-

Mitochondria is known as power house of cell, as it generates energy.

ii- Self replicating organelles:-

Mitochondria is self replicating organelles, as it contain own DNA.

iii- ATP synthesis during Krebs cycle and electron transport chain:-

Mitochondria helps in synthesis of ATP during respiration.

(b) What is doping? Discuss different types of semiconductors.

Answer:-

# 1- Introduction:-

"Doping is the process of adding impurities to create extrinsic semiconductor".

Three types of material are found in earth, on the basis of how they conduct electricity. They are insulators; which don't conduct electricity; conductor; which conduct electricity; and semiconductor: whose conductance is in between conductor and insulator. They are created by adding impurities through process of doping. There are two types of semiconductor: Intrinsic semiconductor and extrinsic semiconductor. Extrinsic semiconductor further divided into two types: P-Type and N-Type semiconductor.

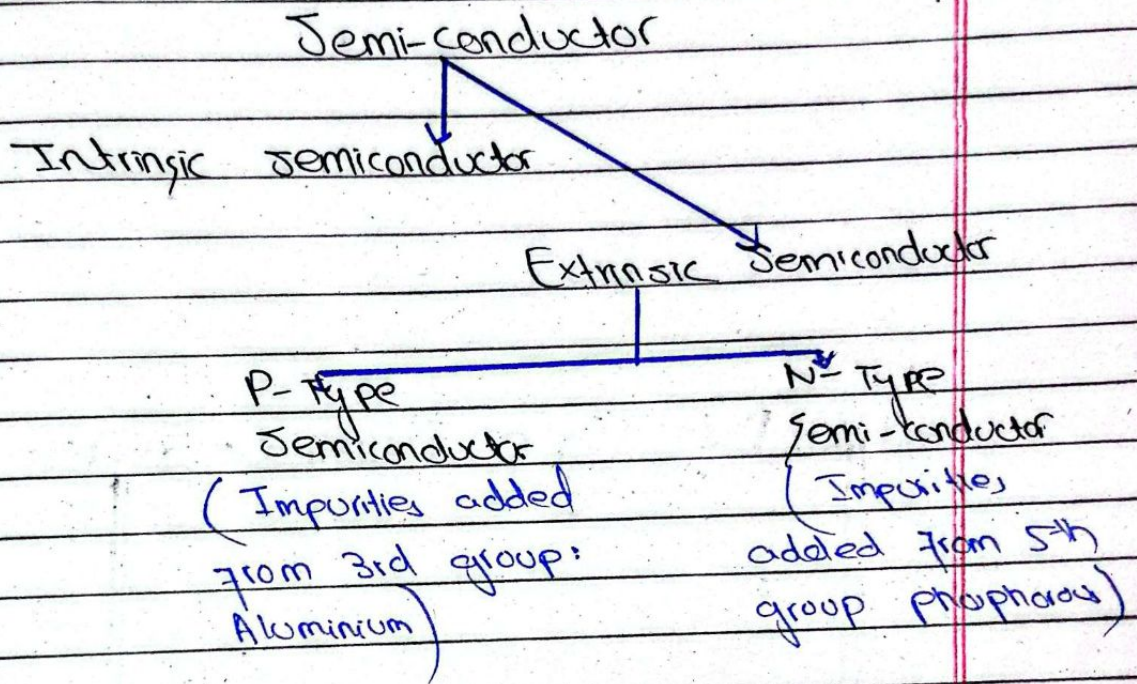
# 2- What is Doping:-

"Doping is the process of creating extrinsic semi-conductor by adding impurities".

Impurities can be added from the fifth group to generate

N-Type semiconductor, or from the 3rd group of periodic table to form P-Type semiconductor.

## 2 Types of Semi-Conductor:-



### 2(a) Intrinsic Semiconductor:

They are natural semi-conductor without any impurities.

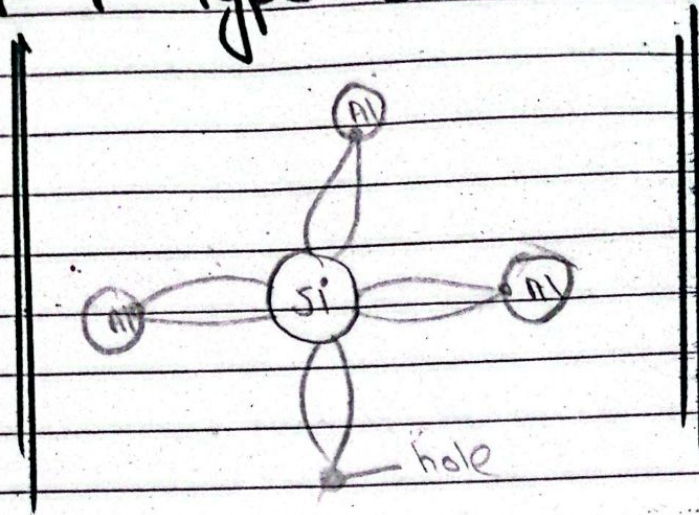
### 2(b) Extrinsic Semiconductor:

These are the semiconductor which are formed by adding impurities. It is further divided into the P-Type and N-Type semiconductor.

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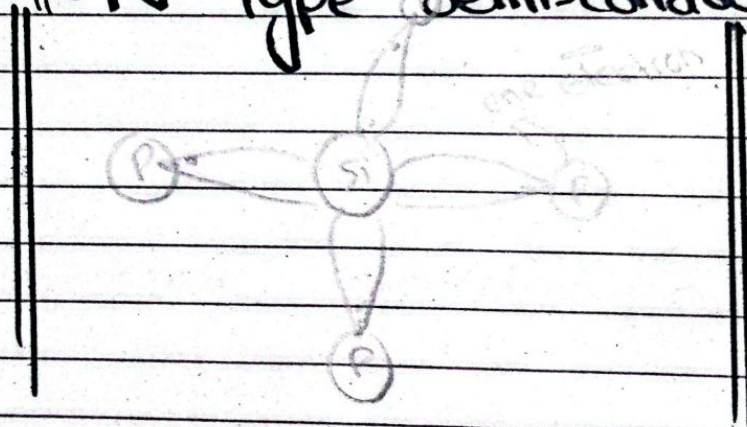
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## i- P-Type Semi-conductor:



Silicon can form four bonds. When Aluminum is added, 3 bonds are formed, and one electron of the silicon can't form bond and it act as whole. This is called positive Type semiconductor.

## ii- N-Type Semi-conductor:



When phosphorus is added in such a way that it forms four bond by sharing four electrons, one electron remains vacant and it can as negative charge.

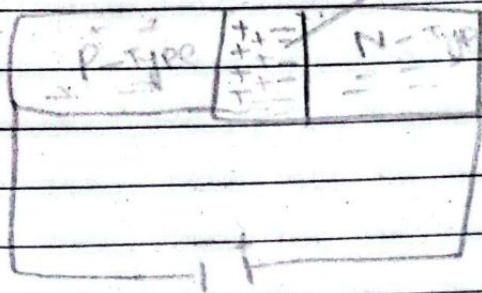
## 2(c) P-N-Junction:-

Type of semi-conductor

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in which both P-Type and N-Type semiconductor are involved. They are used in LED. It can be formed by Biasing.



(c) State some merits and demerits of volcanic eruptions?

**Answer:-**

**1- Introduction:-**

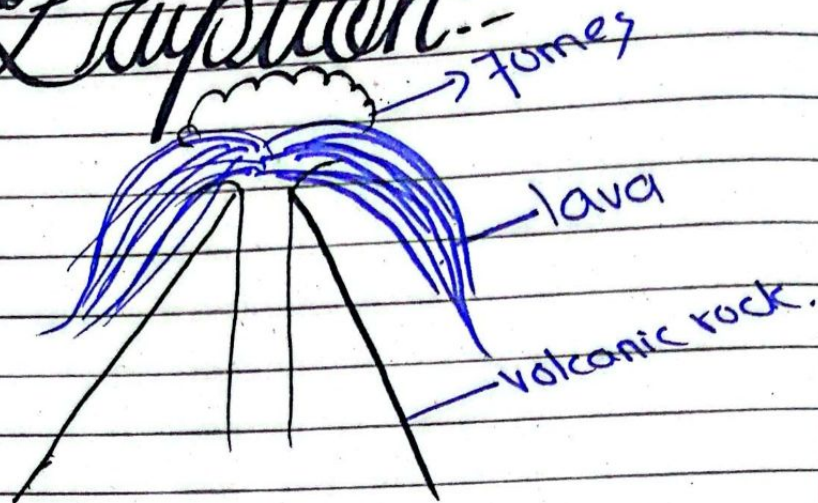
"Volcanic eruption is the coming out of molten rocks in the form of lava"

Volcanic eruption is process when, Magma, molten form of rocks erupt on the surface of the earth and it emerges in form of lava. Its merits are that it creates temperature changes and demerits are that it cause destruction and devastation.

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## 2. What is Volcanic Eruption:-



There are certain rocks in the earth which are present in molten form of lava. When the pressure of gases inside these volcanic mountains increases, the lava emerges on the surface of the earth, and has extremely high temperature.

## 3. Merits of Volcanic Eruption:-

i- It creates changes in Temperature.

Volcanic eruption creates changes in temperature.

ii- Its energy can be used for power generation:

High heat energy of volcano can be harnessed for power generation.

iii- Helps in formation of new rock layers:-

When lava cools down it solidify and helps in the formation of new strata of rocks.

## 4- Demerits Of Volcanic Eruption:

i- It causes destruction:-

Lava destroy everything that comes in its path and cause devastation.

ii- Kills Fauna and Flora:

Every animals and plant species are destroyed, whenever lava erupts.

iii- Devastation of Agricultural Land:

Area of volcanic eruption are prone to become sterile and can't be ready for agriculture.

iv- Global warming and pollution:

Volcanic eruption causes increase in earth temperature and releases  $SO_2$ , exacerbating the pollution.

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(d) What is dengue? Discuss  
symptomology, causative agents and  
remedies.

**Answer:-**

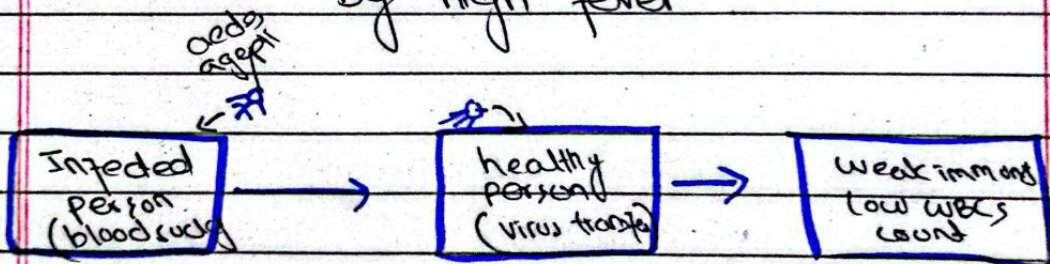
## 1- Introduction:

"Dengue is fever  
caused by virus and  
carried by vector mosquito,  
aedes Aegypti".

Dengue fever is caused by Dengue  
virus, it destroys white blood cells,  
weakens immunity and is marked by  
high fever, headache, shivering, throat  
infection and weakness and can be  
prevented by using mosquito repellents and net.

## 2- What is Dengue?

"Viral infection marked  
by high fever"



Aedes aegypti mosquito is found in  
areas with water high concentration and  
open water bodies around the  
commercial area.

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### 3 Symptoms Of Dengue:

Following are the symptoms  
of Dengue fever.

- i- High grade fever
- ii- Persistent headache.
- iii- Joint pain
- iv- Dizziness and Drowsiness
- v- Low WBCs count
- vi- Weakened immunity
- vii- Sore throat, abdominal pain  
and diarrhea.

### 4 Causative Agent:-

Causative agent of dengue  
fever is virus.

Dengue virus causes Dengue  
fever and is vector borne disease,  
transmitted by mosquito vector:  
"Aedes Aegypti".

### 5 Remedies:-

Remedies of Dengue fever  
includes.

- i- Proper sanitation system
- ii- Using of mosquito repellents  
and spray
- iii- Using of net for sleeping.

## Question: 2

(b) Universe is expanding. how it resembles with balloon blowing in working.

Answer:-

## Introduction:-

"Universe was created as a result of great explosion: big bang"

Universe is created 13.7 billion years ago, as a result of big bang and from then it is expanding with receding speed, and a time will occur when it will come at singularity and everything will end.

## 2-<sup>nd</sup> Universe Is Expanding:-

i- Static Universe theory:-

According to this theory, universe

is static and don't show movement.

ii- Contraction universe theory:-

Universe is dynamic and is contracting.

iii- Expansionist Universe theory,

Universe is dynamic and is expanding.

### 3- Resemblance Of Universe Expanding with blowing balloon model:-

#### 3(a) How Universe is Expanding ~ Red Shift ~

Expansion of universe can be measured by how it emits wavelength. When blue wavelength is detected, it means universe is contracting, while red wavelength shows universe is expanding.

$$V \propto r$$

Velocity      receding speed

"Hubble constant by removing proportional sign"

Universe is expanding and it can be detected by receding speed of galaxies and red shift.

#### 3(b) Resemblance with blowing balloon Model:-

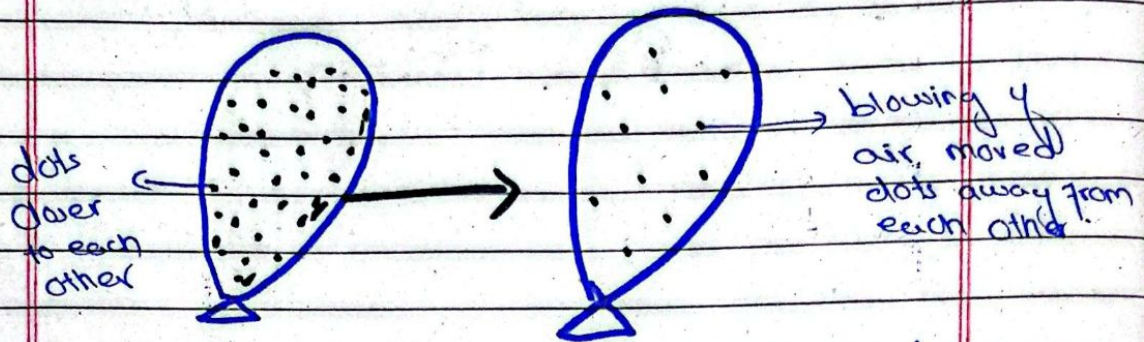
Universe expanding resembles with blowing balloon model. When balloon is marked with dots and

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air is blown inside it dots move away from each other, this is the same way, how galaxies are moving away from each other.

- i- Take a balloon
- ii- Mark dots on it
- iii- blow air inside it
- iv- Dots will move away from each other, just like galaxies.



a- Galaxies are moving away from each other, just like the dots.

## 4-<sup>th</sup> Big Crunch:-

A time will come when universe will expand to its maximum capacity and will collapse again. This phenomena is called as big crunch.

(E) What do you mean by balanced diet? Deficiency of vitamins A, D and E results in what type

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type of imbalances in human body.

Answer

## 1- Introduction:

ee Balance diet is a diet that consists of right amount of nutrients."

Balanced diet contain right amount of nutrients: Carbohydrates, Proteins, Lipids, vitamins, minerals and Fibers. Deficiency of vitamin A causes beriberi, vitamin B causes rickets and vitamin E causes skin problem.

## 2- What Is Vitamins:

ee Vitamins are the nutrients that are essential for normal growth and functioning and can be obtained from diverse sources like milk, cereals, meats, dry fruits and fruits and vegetables."

## 3- Types of Vitamin

i- Fat Soluble vitamins  
Vitamin A, D, E and K

ii- water soluble vitamins  
Vitamin B and C.

# 4- Deficiencies of Vitamins:-

## 4(a) Vitamin A

Vitamin A is also known as Retinol.

Sources:- Fruits and vegetables

Function:- normal functioning of eye.

Deficiency:- Cause disease

"Beri-beri" (night-blindness).

## 4(b) Vitamin D

Sources:- Sunlight is main source

Function: healthy bones and skeleton

Deficiency: weakening of bones and skeleton, and bones become porous and fragile

and disease is known as

"Rickets"

## 4(c) Vitamin E

It is also known as Evion

Source:- milk, green leafy vegs, fruit,

Function: healthy skin, hair, nails, immunity

Deficiency:- It cause dryness

of skin, weakening of nails

and low of immunity

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# 5<sup>th</sup> What is a Balanced Diet?

"Balance diet is a diet that contains right amount of essential nutrients including sugars, fats and minerals along with proteins, vitamins and fiber for normal and healthy functioning of the body"

(d) Discuss working of GPS. What is optic? How 2D and 3D are measured by satellites.

Answer:

## 1. Introduction:

"Global Positioning system is the system of 24 working satellites that gives accurate information about location, time, velocity, latitude, longitude and altitude information"

Global position system work by system of satellite in medium earth orbit consist of space segment, control segment and user segment.

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Optical fiber is the thin fiber that help in transmission of light signals and consist of core, cladding and protective jacket. 3) and 2) are measured by satellites by using its structure subsystem.

## 2- What is GPS?

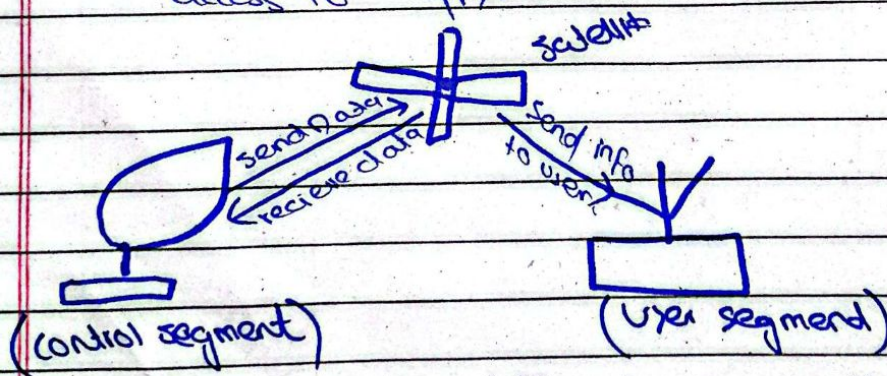
"It is developed by US Defense Department and name as "NAVSTAR".

GPS is Global positioning system and consists of 32 satellites: 24 working and 8 emergency replacement. They orbit in medium earth orbit about 10,600km and give info about time and place in any weather.

## 3- Working of GPS:-

3(a) Who can access to GPS:-

Anyone having smartphone can get access to GPS.



It consist of different system for its working.

3(b) Power System:-

It contain power source for power.

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- 3(c) Propulsion subsystem: Rocket, launching pad
- 3(b) Structure system: To maintain proper structure
- 3(e) Radio subsystem: For info sharing
- 3(f) Computer subsystem: for processing of information

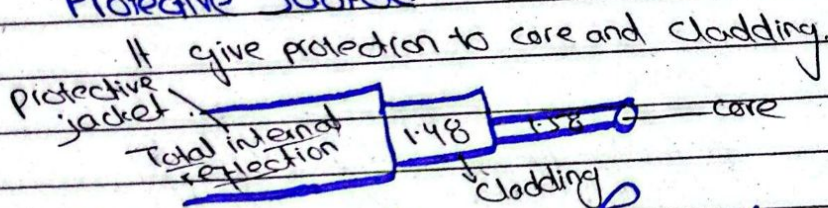
## 4-<sup>Q</sup> What is Optic Fiber?

Optic fiber is thin fiber of  $10^{-4}$  m for transmission of optic signals.

**Core:-** Refractive index of 1.52 and diameter of 120  $\mu$ m

**Cladding:** Refractive index of 1.48 and diameter 300  $\mu$ m

**Protective Jacket:**



## 5- 2D and 3D Locations by Satellite :-

**2D:** Two dimensional location  
Latitude and Longitude

**3D:** Three Dimensional location  
Latitude, Longitude and Altitude.

3D and 2D info is given by satellite by 4 working satellite, each having connection with the control segment.

(a) Data is new oil". Do you agree? Justify with simple opinion and 3 everyday examples.

Answer:-

## 1- Introduction:-

"Data has same importance as oil"

In modern times, importance of data has multiplied. It has become new oil. Everything in this world depends on data and algorithms. From simple calculations to international scientific development, everything is dependent on it.

## 2- Data Is New Oil:-

Data is new oil because:-

- i- Each and every information is stored in form of data.
- ii- It is playing important role in deciding world politics.
- iii- It is essential for the proper functioning of every system.

### 3- Justification With Opinion:-

In my opinion, globalisation has enhanced because of digitalisation. This digital data is bargaining tool in international political and economic system. Emerging of cryptocurrency, cyber warfare, drone, stock exchange each is dependant on data.

### 4- Everyday Examples

#### 4(a) Functioning of Computer ( Alexa, Facebook, Twitter, IMO )

Data is essential for proper functioning of applications on micro, mini, mainframe and super computer.

#### 4(b) Detection of disease and keeping of medical records

Data helps in analyzing of medical images and keeping of medical records of patients.

#### 4(c) Important for setting communication.

Data is very important for setting of communication between different users.

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## Section-II

Question No: 7.

(c) spot the error in the series.

Given:-

2, 6, 18, 54, 162, 486

Find:-

Which number is wrong

Solution:-

$$2 \times 3 = 6, 6 \times 3 = 18, 18 \times 3 = 54, 54 \times 3 = 162, \\ 162 \times 3 = 486$$

Answer:-

Every number is perfectly fit as  
"multiple by 3"

(ii) Given:-

3, 5, 7, 11, 13

Find:

Complete the series

Solution:-

Series of "odd prime number"

3, 5, 7, 11, 13, 17

Answer:-

"17"

b) Five friends total savings = 25,000,  
ratio 1:2:3:4:5. Find the smallest  
share.

Given:-

Combine savings = 25,000

Ratio = 1:2:3:4:5

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**Find:-**

Smallest share

**Solution:-**

$$\text{Total sum} = 25,000$$

$$\text{Ratio} = 1:2:3:4:5$$

$$\text{let share} = x$$

$$1x + 2x + 3x + 4x + 5x = 25,000$$

$$15x = 25,000$$

$$x = \frac{25,000}{15}$$

$$x = 1,500$$

$$\begin{aligned}\text{Smallest share} &= 1(x) \\ &= 1(1,500) \\ &= 1,500 \text{ Rupee}\end{aligned}$$

**Answer:-**

(1500).

(d) A triangle with sides 5cm, 12cm and 13cm. Find all three angles.

**Given:-**

Measurement of 3 sides of triangle

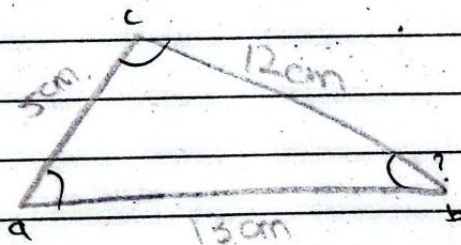
$$a = 5\text{cm}$$

$$b = 12\text{cm}$$

$$c = 13\text{cm}$$

**Find:-**

All three angles.

**Solution:-**

$$\text{Angle } a = 90^\circ$$

$$\text{Angle } b = 60^\circ$$

$$\text{Angle } c = 30^\circ$$

$$\text{Sum of all angles} = 180^\circ$$

(a) Calculate volume of sphere with diameter of 14cm (use  $\pi = 22/7$ )

**Given:-**

$$\text{Diameter of sphere} = 14\text{cm}$$

$$\pi = \frac{22}{7}$$

**Find:-**

Volume of sphere.

**Formula:-**

$$\text{Volume of sphere} = \frac{4}{3}\pi r^3$$

**Solution:-**

$$\text{Diameter} = 14\text{cm}$$

$$\text{Radius} = \frac{D}{2}$$

$$= \frac{14}{2}$$

$$\text{Radius} = 7\text{cm} \rightarrow \text{putting in formula}$$

$$\text{Volume of sphere} = \frac{4}{3} \times \frac{22}{7} \times (7)^3$$

$$= \frac{4}{3} \times \frac{22}{7} \times 343$$

$$\text{Volume of sphere} = 44\text{cm}^3$$

Answer:-

(44 cm)

Question : 6

(d) Unscramble these math terms:

i- STSTAICITS

Answer:-

STATISTICS

ii- LGEMBAR

Solution:-

ALGEBRA

(c) A bicycle covers 36km at 18km/hr starting at 1pm. What does time it reach.

Given:-

Total distance covered = 36km

speed of distance = 18km/hr  
coverage

start time = 1pm

Find:-

Reach time of bicycle.

Solution:-

Distance cover in 1 hour = 18km

Distance cover in 2 hour =  $18\text{km} \times 2$   
= 36km

Starting time is 1pm

Reaching time will be 2pm

Answer:-

(2pm)

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(b) A camera priced 200\$ get 25% off  
Plus 6% tax. Calculate total amount paid.

**Given:-**

Price of Camera = 200\$

Discount = 25%

Tax = 6%

**Find:-**

Total amount paid.

**Formula:-**

$$\text{percentage} = \frac{\text{total}}{\text{obtained}} \times 100$$

**Solution:-**

Discount of camera price

$$= \frac{25}{100} \times 200 \$$$

$$= 50 \$$$

Original price - Discounted price

$$= 200 \$ - 50 \$$$

$$= 150 \$$$

Tax on remaining amount is 6%.

$$= \frac{6}{100} \times 150$$

$$= 9 \$$$

Tax amount + remaining amount

$$= 9 \$ + 150 \$$$

$$= 159 \$$$

Total amount paid = 159\$

**Answer:-**

(159\$)

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(a) A store has packets of candies in flavors Apple, Berry and Date in ratio  $3:6:2:5$ . If apple candies exceed date candies by 35, how many berry candies are there.

Given:-

Ratio of Apple, Berry, <sup>cherry</sup> Date candies =  $3:6:2:5$

Apple candies = 35 + Date candies

Find:-

Number of berry candies.

Solution:-

Ratio of apple candies = 3

" " berry candies = 6

" " Cherry " = 2

" " Date " = 5

Answer:-

Ratio of apple candies is smaller than date candies, so it can't exceed.

If apple candies exceed date candies by 35 then berry candies would be 45.

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