

(Part-II)

{Section-I}

Q:03

(a) Global Warming

Global warming in simple words is a phenomenon in which earth's atmosphere becomes hotter.

Consequences of Global Warming

Global warming has positive effects for the most cold regions of the world. However, for equatorial regions it has brought dire consequences.

- For the colder regions crop cultivation and growth seasons have become prolonged
- For already hotter regions, global warming has caused more dryness, hot weather and shorter crop cultivation and growth seasons.
- However, it may have short-term positive effects for some regions, its long-term effects are disastrous for the whole world.
- A natural slow pace of global warming has been triggered due to various anthropogenic factors.
- If it continues at current pace, scientist fear that earth will surpass not only 1.5°C temperature above pre than pre-industrial era but it may reach 2°C .
- As a result, whole life on this planet earth will be disturbed.
- Many species may get extinct
- Glaciers will melt

- Ocean levels and temperature will increase.
- Natural disasters will bring devastations; infrastructure and human lives will be lost.
- Crop failure will result in food insecurity, famine and conflicts.
- In short, global warming is such a wild beast that it will make this earth a "no more inhabitable planet."

Factors that are Triggering Global Warming

In the post-industrial world, man has been responsible of triggering the wild beast of global warming. Due to increased industrialization, green house gases are emitted in higher levels which are the main cause of global warming.

Following human activities are poking this beast with sticks

1) Transportation

Although transportation is important for the regulation of human activities, but increased private vehicles mean increased fossil fuel usage and increased emission of green house gases (GHGs). These GHGs are emitted directly into the atmosphere, causing global warming.

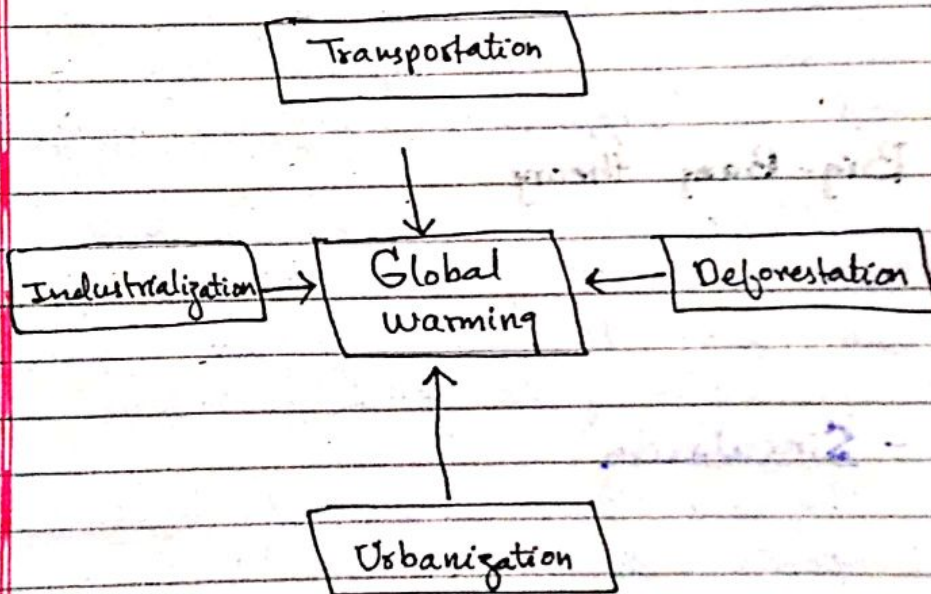
2) Industrialization

In industries human use mainly fossil fuel - non-renewable energy. These fossil fuels have high carbon-

content. When carbon dioxide - a major GHG and other GHGs are released into the atmosphere they activate the phenomenon of global warming.

3) Deforestation

Trees are remarkable natural filters for GHGs. They absorb carbon dioxide during the day, balancing the carbon levels in the atmosphere. However, increased human usage of woods has resulted in deforestation. This deforestation then leads to imbalance in carbon levels in atmosphere.



4) Urbanization

Due to population growth and other demographic factors like migration etc. more and more of human population is settling in urban areas. Increased Urbanization then results in increased transportation, industrialization to meet human

needs and deforestation to build homes and other facilities.

In a nutshell, urbanization and population growth are two main factors that cause other disastrous steps to be taken for short-term safety of humans. But these steps trigger long-term ^{dire} consequences for humans such as global warming and climate change.

b) Origin of Earth

Origin of the Earth Universe has always been an important question to answer. There are various theories through which cosmologists have tried to explain the origin and age of the universe. The most important theory is that of Expansion or Big-bang theory.

Big-Bang theory

According to the Big-bang theory this universe is 13.8 billion years old. This theory is one of the most acceptable explanations of the origin of universe.

- Singularity

Big-bang theory claims that, before expansion, this universe was inside a point that was smaller ~~even~~ than even a pin head. It was so small but too dense.

- Expansion

However, with a sudden burst, the singularity expanded. It is called as Big-bang. Within few seconds, the universe expanded from smaller than

a pinhead to bigger than a galaxy.

- Birth of Time, Space and Energy

With the expansion of Singularity, time, space, and energy were born. Energy

changed into matter and anti-matter.

Anti-matter and matter destroyed each other but some matter survived.

- Formation of stable particles

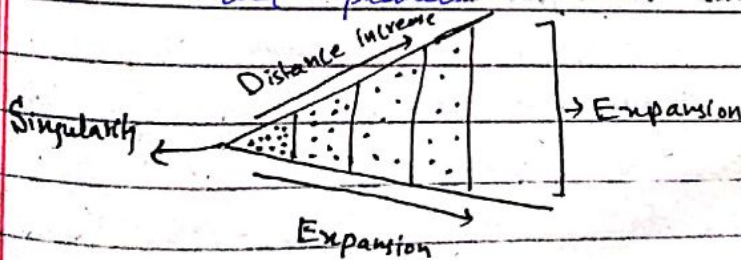
As the temperature dropped a bit, more stable particles like proton and neutrons became to form. Thus they made helium and hydrogen nuclei.

- Formation of atoms

Further drop in temperature caused electrons to join already formed nuclei of hydrogen and helium. As a result, the universe was filled with hydrogen and helium gas and other particles of dust. These

Formation of stars and planets.

These gases and dust then came together under the force of gravity to form stars and planets.



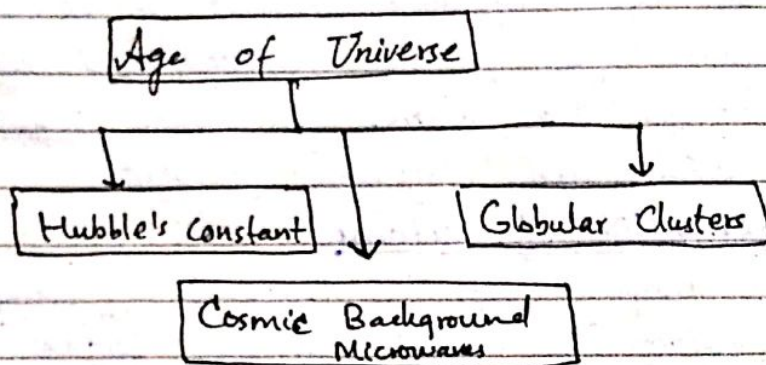
- Big-bang

Age of Universe

Scientists try to estimate age of universe through observation of certain phenomenon. Some of them are as following:

1- Hubble's Constant (H_0)

By observing red-shifts and blue-shifts of galaxies, scientists are of the view that this universe is expanding continuously. This expansion rate is Hubble's constant. By calculating Hubble's constant, scientists can estimate the age of universe.



2- Globular Clusters

Globular clusters are groups of stars that have been born together. By observing the ages of the oldest globular clusters, the estimate about universe age can be made.

3- Cosmic Background Microwaves (CBM)

According to scientists, CBM are the leftover waves of Big-bang energy. These radiations are received from every side of the universe. By observing these radiations, scientists have tried to estimate the age of universe.

(3) C- Semi-conductors

Semi conductors are materials whose conductivity lies between those of insulators, that have zero conductivity, and those of conductors - that have highest conductivity. These materials are very significant in current technological eras.

Types

Semi-conductors have two types:

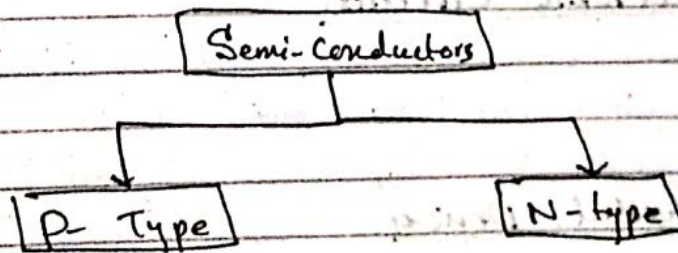
- i) P-type Semiconductors
- ii) N-type Semiconductors

P-type Semiconductors

P-type semiconductors have greater quantities of holes.

N-type Semiconductors

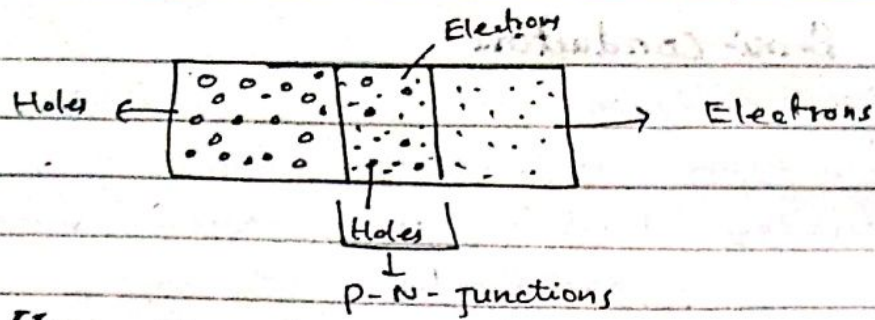
N-type semiconductors have greater no. of electrons.



P-N Junction

When P-type semiconductors are joined with N-type semiconductors to make a two-terminal semiconductor, it is called as P-N junction.

- P-N junction makes the current flow smooth and one directional.
- P-N junctions are used in LEDs.



Uses of Semi-Conductors.

- Semi-conductors are very useful in current technological era.
- They are often called as brains of "modern electronics"

Micro-processor

Semi-conductors are used as micro-processor in computers and smart devices such as mobile phones, tablets etc.

Memory

Semi-conductors are an important part of RAM.

Electronic Circuits

Semi-conductors are used in electronic circuits due to their unique conducting properties.

Powerful Devices

With semi-conductors it has become possible to minimize electronic circuits to make small but powerful devices.

Miscellaneous Uses

Semi-conductors are very important for manufacturing different important items and materials. They are used in medical devices, aeroplanes, cars, Artificial Intelligence, LED, etc.

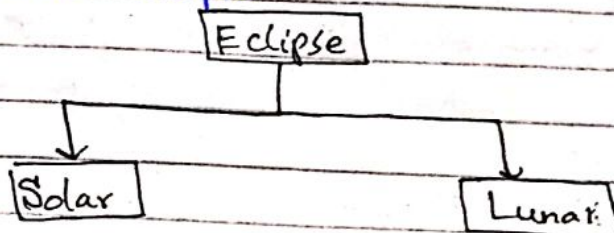
(3) d. Eclipse

Eclipse is a phenomenon when one celestial body comes between two other celestial bodies and affect reflection of light etc.

Two eclipses related to our earth are:

i- Solar eclipse

ii- Lunar eclipse



Difference between Solar & Lunar Eclipse

1- Solar Eclipse

Solar eclipse is a phenomenon when moon comes between sun and earth and full sunlight is unable to reach the earth because the shadow of moon obstructs it.

Duration

Solar eclipse occurs for short time and visible only from certain specific locations on earth.

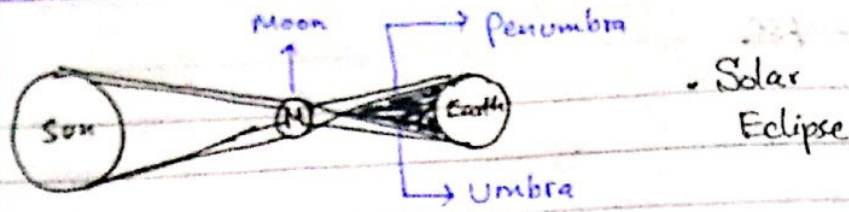
→ It occurs mostly during the time of new moon.

Types

Full-solar Eclipse

It occurs when moon completely blocks sunlight from reaching the earth and sun appears black from earth.

It is very rare.



2. Partial Solar Eclipse

It occurs when moon covers only partial of sun's disk.

During this phenomenon, sunlight is not totally obstructed from reaching the earth, but part of sun is visible from earth.

3. Annular Solar Eclipse

It occurs when moon passes from the centre of sun's disk.

An annular shape of sun appears in which central part of sun is darker and the ring looks bright.

2. Lunar Eclipse

Lunar eclipse occurs when earth comes between sun and moon.

Moon has no light of its own. It reflects sunlight and looks bright.

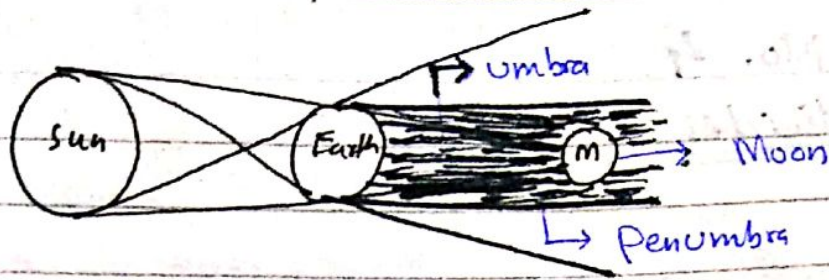
When earth passes between sun and moon, moon cannot receive sunlight and instead earth's shadow. So, it looks dark or red.

Duration

→ The duration of lunar eclipse is longer than sun.

→ It can be viewed from larger area than that of solar eclipse.

→ It occurs mostly during full-moon.



• Lunar Eclipse

Types of Lunar Eclipse

i- Penumbral Lunar Eclipse

It occurs when moon passes from penumbra of the earth's shadow. Penumbral shadow is not very dark so the moon appears red.

It is not visible sometimes, from the earth.

ii- Partial Lunar Eclipse

It occurs when part of the moon passes from the umbral region of the earth's shadow.

As a result half of the moon remains visible from the earth.

iii- Total Lunar Eclipse

When full moon passes through the umbral region of the earth's shadow total lunar eclipse occurs.

In this case moon looks dark black from the earth.



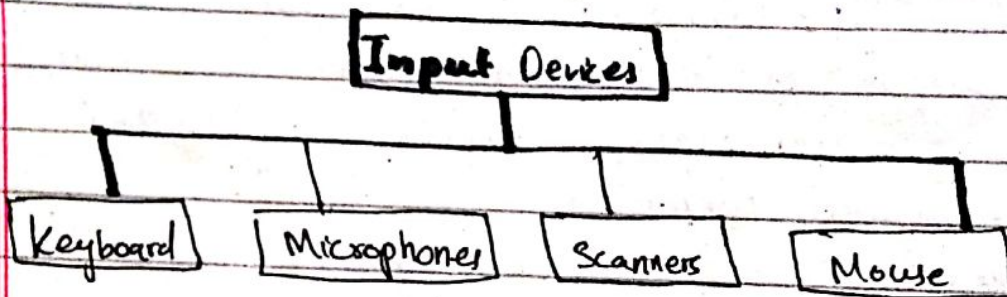
Q: 05-

(a) Block diagram of Input and Output Devices

Input Devices

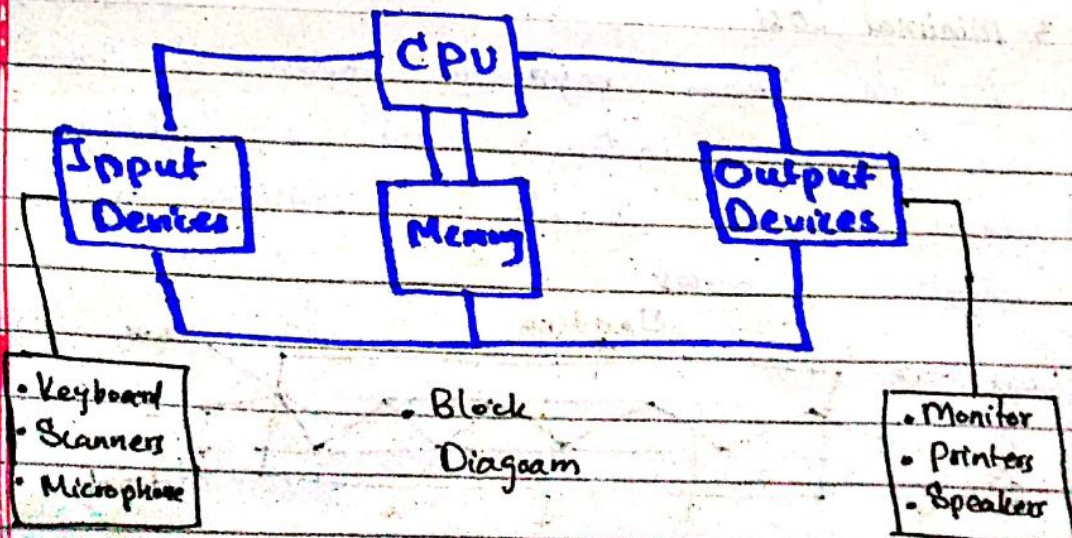
Input devices are those devices that are used to send and enter data into computer.

For example: key board, scanner etc.



Output Devices

After receiving input from the user, computer processes it and converts it into output. The devices that present output to the user are called as output devices.



5.(b) Optical Fiber

Optical fiber is a thin wire made of glass that is used to transmit signals to longer distances.

Optical fibers are durable, safe and secure.

They have wide range applications in communication, networks, medical equipments etc.

Working Principle of Optical Fiber

Optical fibers work on the principle of total internal reflection.

Following steps elaborate the working of optical fibers.

1: Light source

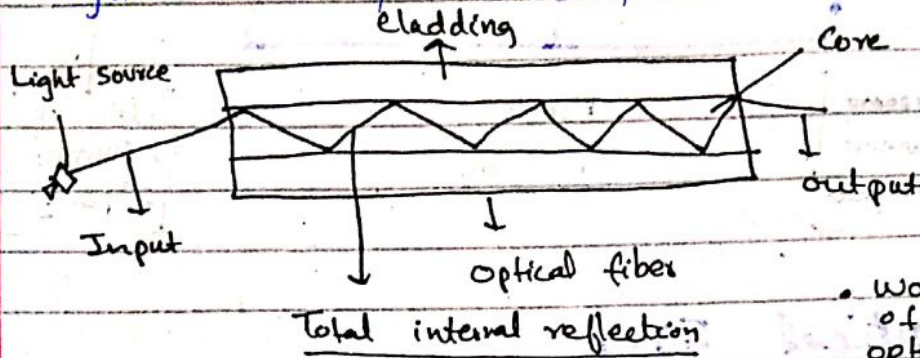
Input is given to optical fibers in form of light. Light in form of LED-generated or laser enters one end of optical fiber.

2- Core Reflection

When it enters the core it is kept inside it by reflection. It is trapped inside the core when its angle of incidence is greater than its critical angle.

3- Minimal Loss

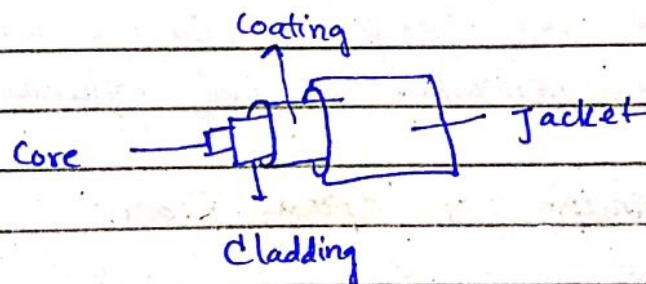
Due to higher refractive index of core and lower refractive index of cladding, the loss of signals is minimal because light is totally internally reflected.



• Working of optical Fiber

4- Output

The light signals exit the ^{other} end of the optical fiber where it is converted back into electrical signals for data transmission.



Structure of Optical Fiber

Q:5(d) : GPS & GIS

GPS

Global Positioning System (GPS) is a satellite based system to get information about time, speed, and position accurately 24/7.

→ It was founded by US Airforce for military purposes.

Components of GPS

1- Space Segment

GPS space segment consists of 24 constellations of satellites.

The satellites give information about time, speed and position of a person or an object.

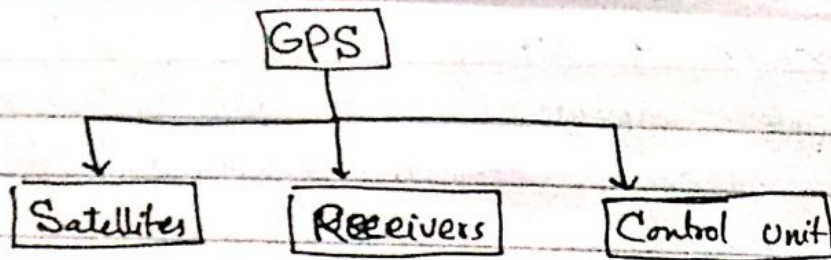
2- Control Unit

GPS has its control unit based on ground. Control unit maintains communication with satellites in space, monitor their function and rectify any malfunctions if occur.

3 Receiver

Receivers are the devices that ~~get~~ receive output from the satellites.

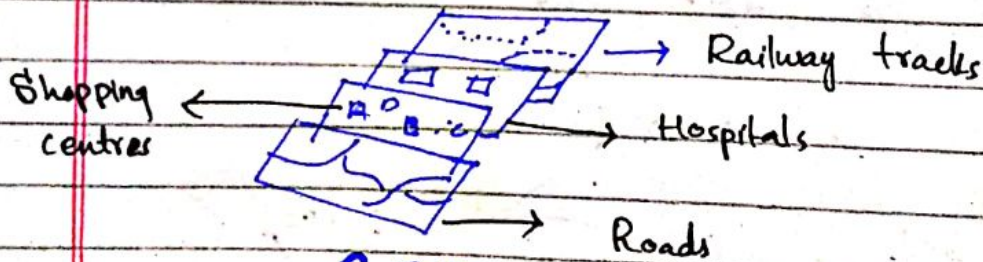
They can be computer monitors, mobile phones ~~or~~ any device that receives signals from satellites and display output to the users.



Geographic Information System (GIS)

Geographic Information System (GIS) provides computer-based analysis and display of geographically referenced data

- It is a computer system
- It divides geographical data in different layers. Each layer displays a particular type of data.
- For example, if GIS contains information about a city, its data will be divided into different layers. One layer may represent data about roads, other about shopping centres, third about hospitals etc.



. GIS

Components

1- Hardware

It includes different input output devices to enter and retrieve data.

2- Software

It includes special applications to analyze geographical data

3 Users

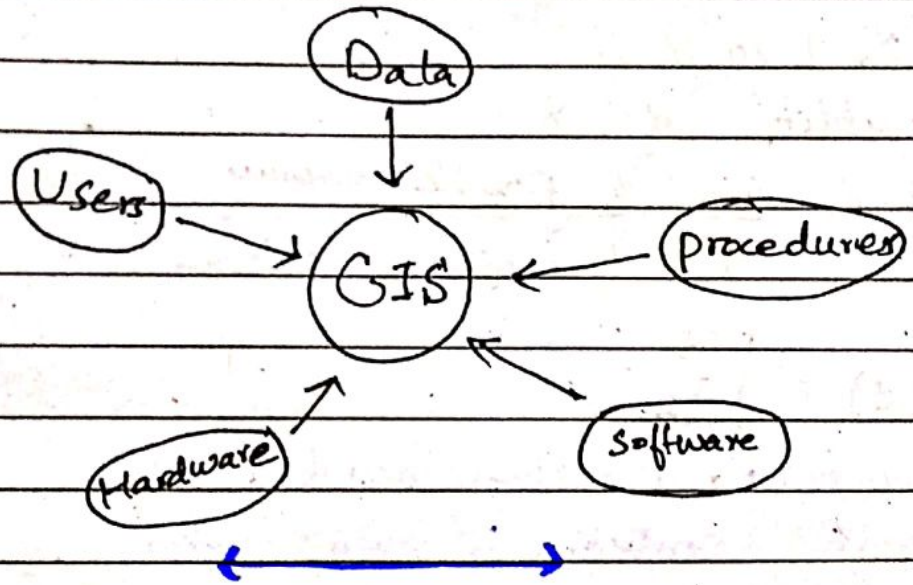
Users are people who manage and control GIS.

4- Procedures

Procedures include guidelines for proper usage of GIS.

5- Data

Different forms of data, for example, geographical, tabular and spatial data.



Section - II

Q: 08

(a) Sol

The code for "BROTHER" is "QDGSNQA" which is one step-back and in reverse order. So, the code for ~~SIST~~ "SISTER" will be "QDSRHR".

09. B. Sol

12 cards containing numbers, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

i) Probability of 8

$$P(8) = \frac{\text{No of possible outcomes}}{\text{No of possible outcomes}}$$

$$P(8) = \boxed{\frac{1}{12}}$$

ii) probability of even numbers

"1... 12" contain 6 even number

So,

$$P(E) = \frac{\text{No of ways of outcomes}}{\text{No of possible outcomes}}$$

$$= \frac{6}{12} = \boxed{\frac{1}{2}}$$

iii) probability of perfect square

These no contain 2 perfect square 4, 9

$$\text{So, } P(S) = \frac{2}{12} = \frac{1}{6}$$

iv) No less than 13

All these number are less than 13

$$\text{So, } P(\text{less than 13}) = \frac{12}{12} = \boxed{1}$$

v) Negative Number

This set 1 --- 12, contains no negative number.

So, Probability of Negative no will be:

$$P(N) = \frac{0}{12} = \boxed{0}$$

8(d) $\frac{51}{2}$

Mean: $\frac{\text{Sum of observations}}{\text{Total observations}}$

$$= \frac{15 + 15 + 16 + 16 + 17 + 17 + 18 + 19}{9}$$

$$= \frac{149}{9} = \boxed{16.5}$$

Median

Median is the mid value in arranged data. So, in 15, 15, 16, 16, 16, 17, 17, 18, 19 median will be "16"

Mode

Mode is the most repeated value in the data.

So, here mode is also "16"

Range

Range = Highest value - Lowest value

$$= 19 - 15$$

$$= \boxed{4}$$

Q: 7

a. Soll

Capacity of the hall = 400 seats

Total occupied seats = 325

% of attendance = ?

Attendance percentage = $\frac{\text{occupied seats}}{\text{Total capacity}} \times 100$

$$\% = \frac{325}{400} \times 100 = \boxed{81.25\%}$$

So, the attendance at percentage capacity is 81.25%