

# Subjective Part

Q. No. 2

(a)

## Star

### Definition,

- A star is a huge, luminous ball comprising hot gases mainly hydrogen and helium.

- **Example:** Sun is a star.

- Stars produce their own light and heat through the processes of nuclear fusion.

- Stars have high temperatures and undergo nuclear reactions.

## Planet

- Planet is a non-luminous celestial body that revolves around the stars.

- Earth, Venus, Mars etc.

- Planet does not have its own light but reflects star's light.

- Planets have low temperatures as compared to stars.

# Life Cycle of a star:

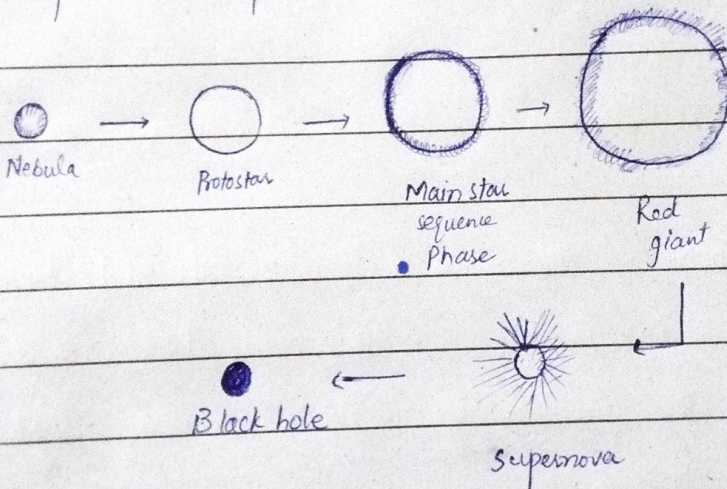
Life cycle of a star consists of six phases.

## 1- Nebula

A star begins its life as nebula. At this stage it is a huge cloud of dust and gases.

## 2- Protostar

The gas contracts and heats up to form a protostar.



## 3. Sequence Phase:

Temperature becomes high and nuclear fusion starts. Here hydrogen is converted into Helium. At this stage star becomes stable e.g. Sun is presently in this condition.

## 4- Red Giant:

Why hydrogen is completely converted

into helium star cook down & expand and become a red giant.

### 5- Supernova:

Sometimes supergiant explodes and spread its elements in space and it is called supernova.

### 6- Black Hole:

The remaining core of Supernova after explosion becomes black hole.

---

(b)

### Semiconductors:

It can be defined as "A material that has electrical conductivity between conductors and (insulators) non-conductors is called semi-conductor."

Example of semi conductors is Silicon (Si) and Germanium (Ge).

- Its conductivity can be modified by doping and by increasing temperature.

### Types of Semiconductors.

#### 1- Intrinsic Semiconductors

These are pure materials

without any impurities

## 2- Extrinsic Semi-conductors:

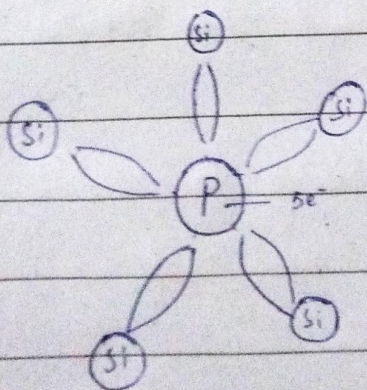
These are doped with impurities to increase their conductivity. It has two types n-type and p-type

### Difference between n-type and p-type Semi-conductors,

#### n-Type

- This type of semiconductor is doped with metals having free valence electrons

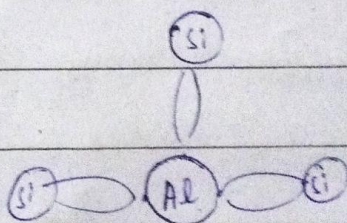
e.g. Phosphorus with penta-valent electrons



#### p-Type

It is doped with metals having fewer valence shell electrons

e.g. Aluminium with 3 valence shell electrons



### Uses of Semi-conductors:

uses of semi-conductors.

Here are some

## a- Diodes:

Semiconductors help in current flow towards single direction so they are used as diodes in LEDs.

## b- Transistors:

They are used as switches in circuits and is building block of memory chips.

## c- Solar Cells:

Semiconductors are used in making solar cells and it is the most widely used use of them.

## d- Sensors:

Semiconductors are used in sensors of temperature, pressure sensors and other detection.

## e- Power electronics:

They have ability to conduct and resist high voltage so are used in power electronics nowadays.

(C)

## Global Warming:

It can be defined as the "gradual increase in Earth's average temperature due to accumulation of greenhouse gases in atmosphere."

- The heat that comes to earth's atmosphere is trapped inside and increase the average temperature of earth.

## Mechanism of Greenhouse Effect:

Greenhouse effect refers to the process of trapping heat in earth's atmosphere preventing it from escaping back into space. Following are the steps included to explain the process of Greenhouse effect.

### 1- Solar Radiations

Sun emits energy in the form of sunlight that reaches earth's surface.

### 2- Absorption and Heating.

Earth absorbs most of this heat and its temperature rises.

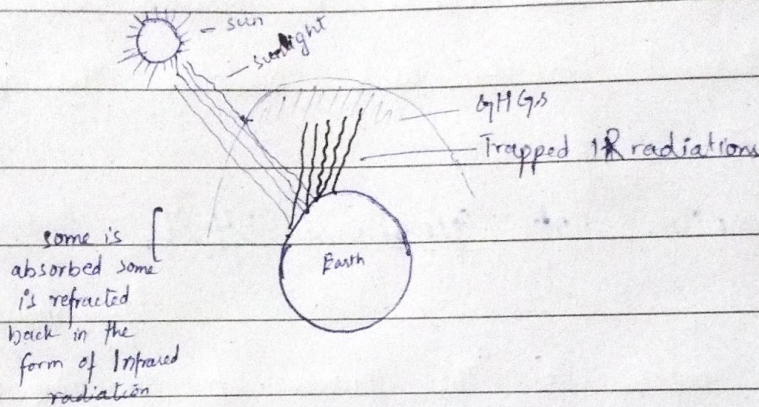
### 3. Infrared Radiations and its Trapping.

Earth releases some infrared radiations back to atmosphere but instead of

going into space these radiations are trapped in earth's atmosphere by greenhouse gases.

#### 4. Temperature Increase:

This trapped heat causes increase in earth's temperature similar to the greenhouse trap of heat inside it.



#### Name of GHGs.

- 1- Carbon dioxide  $\text{CO}_2$
- 2- Methane  $\text{CH}_4$
- 3- Nitrous Oxide  $\text{N}_2\text{O}$

(d)

#### Tsunami.

It can be defined as the "Series of large or massive ocean waves usually caused by disturbance under or near the ~~de~~ ocean surface."

## Processes that Trigger Tsunami:

### 1- Earthquake.

Earthquake is the major cause of tsunami. When movement in plate tectonics occurs, it causes the movement of ocean waves to become huge and thus trigger the tsunami.

### 2- Volcanic Eruption.

Volcanic eruption near the sea or ocean causes earthquake due to eruption of mountain. It causes huge seismic waves and thus the ocean waves cause tsunami.

### 3- Land Slides.

Large landslides falling in ocean, usually from coastal cliffs, causes the water push and generate tsunami waves.

## Impacts on Coastal Life:

### 1- Flooding:

Tsunami can trigger the cause floods in coastal lands, homes and agricultural lands.

### 2- Loss of Life:

Sudden and powerful ocean waves

can be dangerous if not predicted beforehand. People living in coastal areas can even lose their lives by drowning in pressured waves.

### 3- Economic Loss.

If not managed carefully before its arrival, tsunami can cause damage to local businesses like fishing, tourism etc.

### 4- Loss of Infrastructure.

Destruction of buildings, vehicles and other economically wealthy things can be the result of tsunamis.

---

## Q. No. 3

(a)

### Mitochondria:

It is an important organelle within cell and is known for its important functions.

### Functions of Mitochondria:

Mitochondria performs many important functions in cell and is called as "Powerhouse of the cell". Following are

the function it performs.

1. Metabolism:

It helps in metabolism of Proteins.

2. Calcium Regulation:

This is a very important function of mitochondria. It maintains the amount of calcium inside the cell.

3. Protein synthesis:

Mitochondria performs this role which is important for the survival of a cell i.e. Protein synthesis.

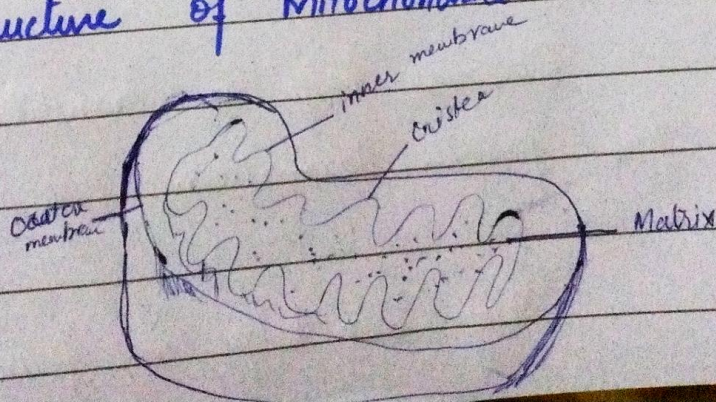
4. Heat Production:

It maintains temperature of cell by producing heat while doing the other functions.

5. Apoptosis:

When a cell dies its heat and other remains are engulfed and managed by mitochondria.

## Structure of Mitochondria



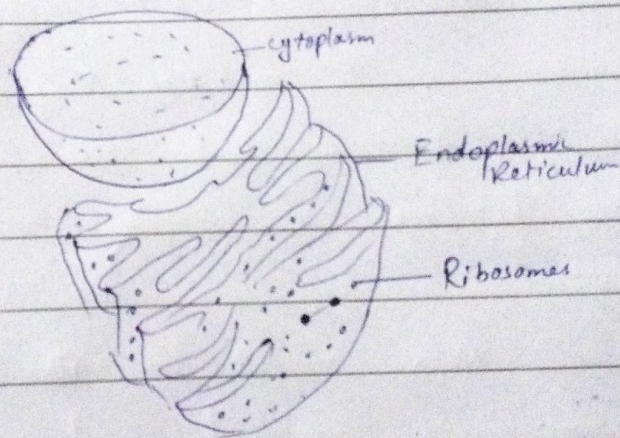
Date: \_\_\_\_/\_\_\_\_/20\_\_\_\_

Mitochondria consists of a convulated structure called Matrix <sup>packed</sup> inside a cylindrical shaped body. The matrix's convulsions are called cratea. Inside the matrix there are granules which help in protein synthesis and calcium regulation.

## Ribosomes.

~~S~~ Ribosomes are the small organelles which are either attached to endoplasmic reticulum or floating around the cytoplasm.

## Structure.



## Functions.

### 1- Protein Synthesis:

Ribosomes help in translating mRNA for protein formation.

### 2. Peptide formation

They also help in formation

of peptide bonds from amino acids.

(b)

## Enzymes:

Enzymes are biological molecules, mostly proteins, that act as a catalyst and speed up the chemical reaction.

Enzymes lower the activation energy of reactions to make metabolism and digestion efficient under mild conditions.

## Lock and Key Model of enzymes.

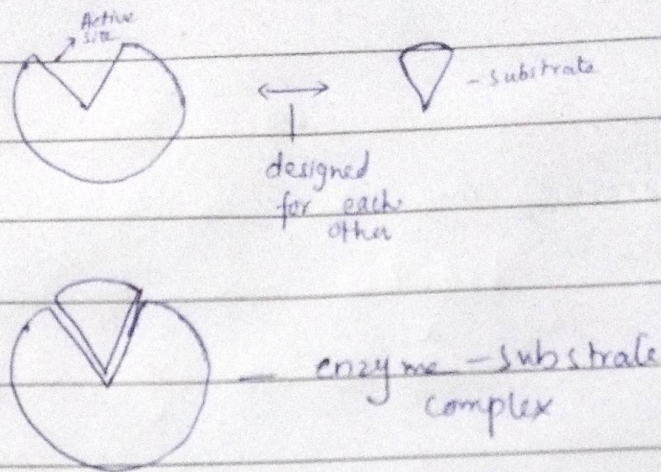
Enzymes consists of two parts

- 1) Active site - For enzyme to be attached
- 2) Substrate

To explain the working of enzyme Emil Fischer in 1880s presented Lock and Key model. According to this model, enzymes active site and substrate are designed specifically for each other just like a lock and key are designed for each other.

The active site of specific enzymes get attached to its specific substrate.

to form enzyme-substrate complex.



## Factors affecting Enzyme reaction

### 1. Temperature:

Enzymes have specific temperature for their working called optimum temperature. Any change in temperature can effect the working of enzyme.

### 2. pH:

Enzymes work under special pH. For example pepsin works best under acidic condition, 1.5 - 2 pH. If pH becomes less acidic pepsin becomes less active or completely inactive.

(C)

Renewable energy ResourcesDefinition

- These are the sources of energy that can be easily replenished.
- e.g. Solar, wind, biomass etc.
- They are present unlimited and are naturally replenished
- Generally not harmful for environment

Non-Renewable Energy Resources

- These sources exist in limited amount and cannot be replenished.
- e.g. Coal, oil, natural gas etc.
- They are finite
- Usually harmful for environment.

Wind Energy:

Wind energy is the renewable and naturally existing source of energy. It is used widely around the globe to produce electricity and is considered as a sustainable source for the future as well.

Reasons:

- 1- Electricity is produced by using turbines and windmills. It is quite safe and unharmful source of energy.

Date: \_\_\_\_/\_\_\_\_/20\_\_\_\_

| MON                      | TUE                      | WED                      | THS                      | FRI                      | SAT                      |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

2. Clean and Sustainable, as it does not emit any harmful gases or particles that can contaminate environment.
3. It will reduce the dependence on fossil fuels which are the non-renewable sources of energy.

## Q. No. 7

(a)

### Solution

$$\text{Total no of People} = 100$$

$$\text{Cricket} = C = 65$$

$$\text{Hockey} = H = 40$$

$$\text{Who watched nothing} = 20$$

$$\text{Who watched both} = ?$$

$$\begin{aligned}\text{How many watched at least one} &= 100 - 20 \\ &= 80\end{aligned}$$

$$\begin{aligned}\text{Adding who watched } C \text{ and } H &= 65 + 40 \\ &= 105\end{aligned}$$

The number exceeds total so to calculate the number who watched both

$$\begin{aligned}105 - 80 \\ = 25\end{aligned}$$

25 people watched both.

(b)

Data Given:

$$\text{Length of pool} = l = 4 + w$$

$$\text{Perimeter} = P = 72 \text{ m}$$

$$\text{Depth} = D = 2.5 \text{ m}$$

$$\text{Volume of water needed} = ?$$

Solution

$$\text{Perimeter} = 2(l + w)$$

$$72 = 2(4 + w + w)$$

$$36 = 4 + 2w$$

$$w = 16 \text{ m}$$

To find volume we need area

$$\text{Area of Rectangle} = l \times w$$

$$= (4 + w) \times w$$

$$= (4 + 16) \times 16$$

$$= 320 \text{ m}^2$$

$$\text{Volume} = \text{Area} \times \text{depth}$$

$$= 320 \times 2.5$$

$$= 800 \text{ m}^3$$

800 m<sup>3</sup> of Water is required to fill the pool.

(C)

Given Data:

Time of leaving for Both Trains = 8 AM

Speed of Train A =  $60 \text{ kmh}^{-1}$ Speed of Train B =  $40 \text{ kmh}^{-1}$ Distance of City A to B =  $S = 400 \text{ km}$ Time of meeting,  $t = ?$ 

Solution

Combined speed of both trains =  $60 + 40$ 

$$v = 100 \text{ km/hr}$$

To find the Time

$$t = \frac{S}{v}$$

$$t = \frac{400}{100}$$

$$t = 4 \text{ hrs}$$

4 hours ahead of 8 AM = 12 PM

Trains will meet at 12 PM

(d)

Given Data:

Let The age of Father and Son is  
A and B respectively

$$A + B = 75 \text{ years} \quad (1)$$

$$\text{Condition} \Rightarrow A - 10 = 4(B - 10) \quad (2)$$

Solving eq (2)

$$A - 10 = 4B - 40$$

$$A = 4B - 30 \quad (3)$$

Putting The value of A from eq 3 in eq. (1)

$$A + B = 75$$

$$4B - 30 + B = 75$$

$$5B = 105$$

$$\boxed{B = 21}$$

Putting the value of B in eq. (1)

$$A + B = 75$$

$$A + 21 = 75$$

$$A = 75 - 21$$

$$\boxed{A = 54}$$

Age of Father = 54 years

Age of Son = 21 years

# Q. No. 8

(a)

|    |    |    |    |
|----|----|----|----|
| R  | O  | A  | D  |
| 18 | 15 | 1  | 4  |
| +3 | +2 | +3 | +3 |
| 21 | 17 | 4  | 7  |
| U  | Q  | D  | G  |

Following the pattern

LAKE = O C N H

(b)

Man is the maternal uncle <sup>in law</sup> of that woman

(c)

(i) 4, 12, 6, 18, 9, 27, —

4, 12, 6, 18, 9, 27, 13.5

ii 1, 2, 6, 24, 120, —

1, 2, 6, 24, 120, 720

Date: \_\_\_\_/\_\_\_\_/20\_\_\_\_

(d)

Solution

According to given data

R P Q S T

• ~~The~~ third Tallest is Q

• Range

To Find Range

$$\text{Range} = \text{Max no} - \text{Min No.}$$

$$= 180 \text{ cm} - 150 \text{ cm}$$

$$= 30 \text{ cm}$$