

QNo2 (C) Explain the terms Dark Energy and Dark matter

Ans.

### Dark Energy

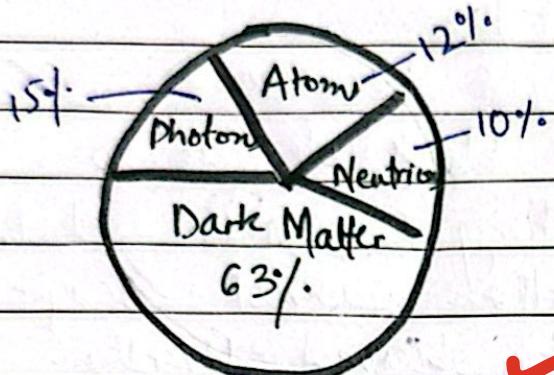
Dark energy is the energy that helps in the expansion of the universe. In fact, in 1988, astronomers studying distant supernovae were shocked to learn that the universe began expanding faster around 7.5 billion years after the Big Bang. That indicates some unknown force is fighting gravity's pull, causing galaxies to speed apart from one another.

Dark energy is a repulsive force. It repels the objects, due to which things move far away from each other.

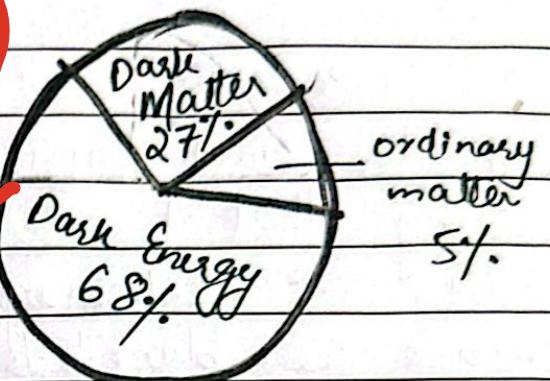
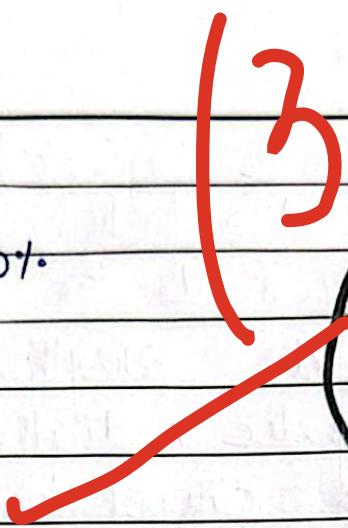
### Dark Matter

Dark matter comprises particles that do not reflect, absorb, or emit light - Thus, they cannot be detected by observing electromagnetic radiations. It is a material that cannot be seen directly. It is mysterious and invisible substance. The composition of dark matter is: Super-dense astronomical bodies called massive astrophysical compact halo objects (MACHTOS) and weakly interacting massive particles. (WIMPS)

attempt the two concepts by giving more detail.



13.8 Billion  
years ago



Today

Q.2 (Q) Define the term Black Hole. What's expected inside it?

Ans: Black hole

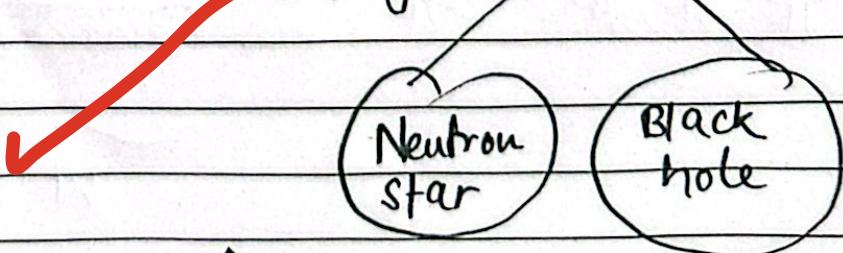
A black hole is a cosmic body in the centre of almost every galaxy in the universe, including the Milky Way galaxy in which our solar system exists.

Example

Sagittarius A\* is a super massive hole that exists at the centre of the Milky Way Galaxy.

Formation of Black hole

Stellar Nebula  $\rightarrow$  Massive Star  $\rightarrow$  Red Supergiant  $\rightarrow$  Super Nova



What is expected inside the black hole?

The black hole is called a black hole because the gravity and density inside the black hole are so strong that it attracts everything coming toward it. Even the electromagnetic radiation cannot escape. Hence, the black hole cannot be observed directly. However, it can be observed by its gravitational influence on nearby matter. The boundary of black holes is called the event horizon.

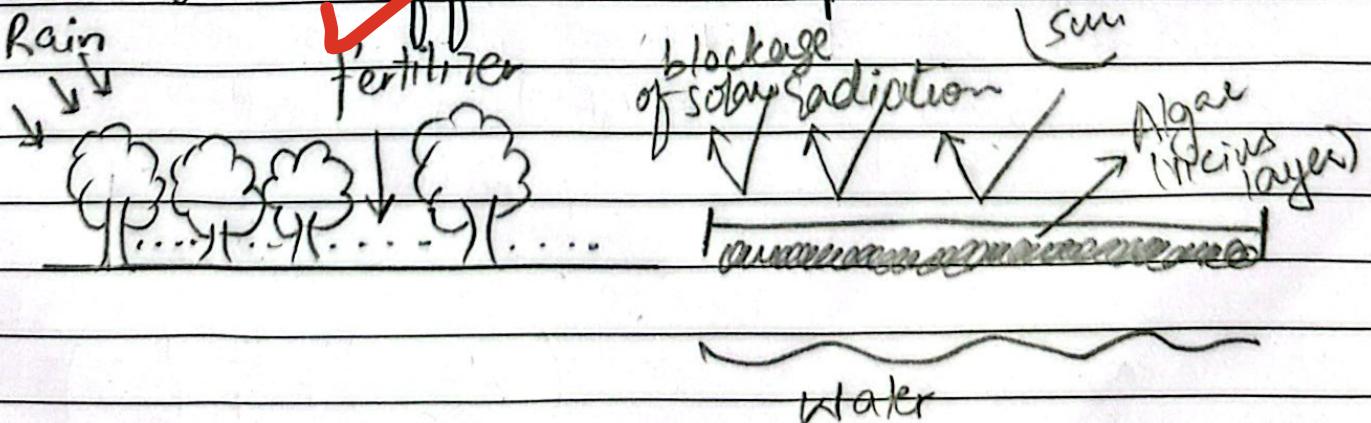
Q. 4(B) What is water pollution. Discuss its causes and measurement methods. Name the countries with the highest and lowest percentage of it.

Ans. Water pollution

Any change in the physical and chemical properties of water that makes it unsuitable to drink and for the use of other purposes.

Causes of Water pollution

1. Excessive use of fertilizers - Eutrophication



When solar radiations, blocked by algae formed in the excess water due to fertilizers, can't reach the plant bodies present in the water + consequently the plant bodies cannot produce oxygen. The micro-organisms then start consuming oxygen from water itself, ultimately the level of dissolved oxygen decreases leading towards polluted water.

## 2. Industrial Waste

The toxic waste and heavy metals such as zinc, calcium, mercury and lead leached from industries make water polluted by consuming oxygen from water which lead to decrease in dissolved oxygen level and the water becomes polluted.

## 3. Marine Pollution

The oil spillage from ships, blocks the solar radiation which again causes water to be polluted.

## 4. Domestic Waste

Domestic waste increases the turbidity, which pollutes the water.

### Measurement methods of water pollution.

#### 1. Measuring Temperature

If the temperature of water is between 0-30°C then water is not polluted, but if it exceeds the range then water is considered polluted.

#### 2. Turbidity Test

Turbidity of water can range from 1-50 NTU, if it exceeds these values then water is polluted.

### 3. Measuring total dissolved solids.

Total dissolved solids (TDS) is the term used to describe the inorganic salts and small amounts of organic matter present in solution in water. The value for pure water is 0-100 mg/L, if the value exceeds that means water is polluted.

### 4. P-H value

If the P-H of water ranges between 6.5-8.5, then water is pure but in case of excursion of this value, the water becomes polluted.

### 5. Odour

The intensity of taste and odour in water is expressed in terms of a unit called Threshold Odour Number (TON), which signifies the dilution ratio at which taste and odour are hardly detectable. Through this, the polluted water is recognized.

### Q. Countries with highest and lowest water pollution

1. Norway and Sweden are the countries with lowest water pollution

2. Central African Republic and Chad are the countries with highest water pollution.

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Q.4(C). Write a comprehensive note on 'Smog'

Ans. Definition.

Smog is the combination of smoke and fog. It is an air pollution that reduces visibility.

Types of Smog

1. Classical Sulphurous Smog

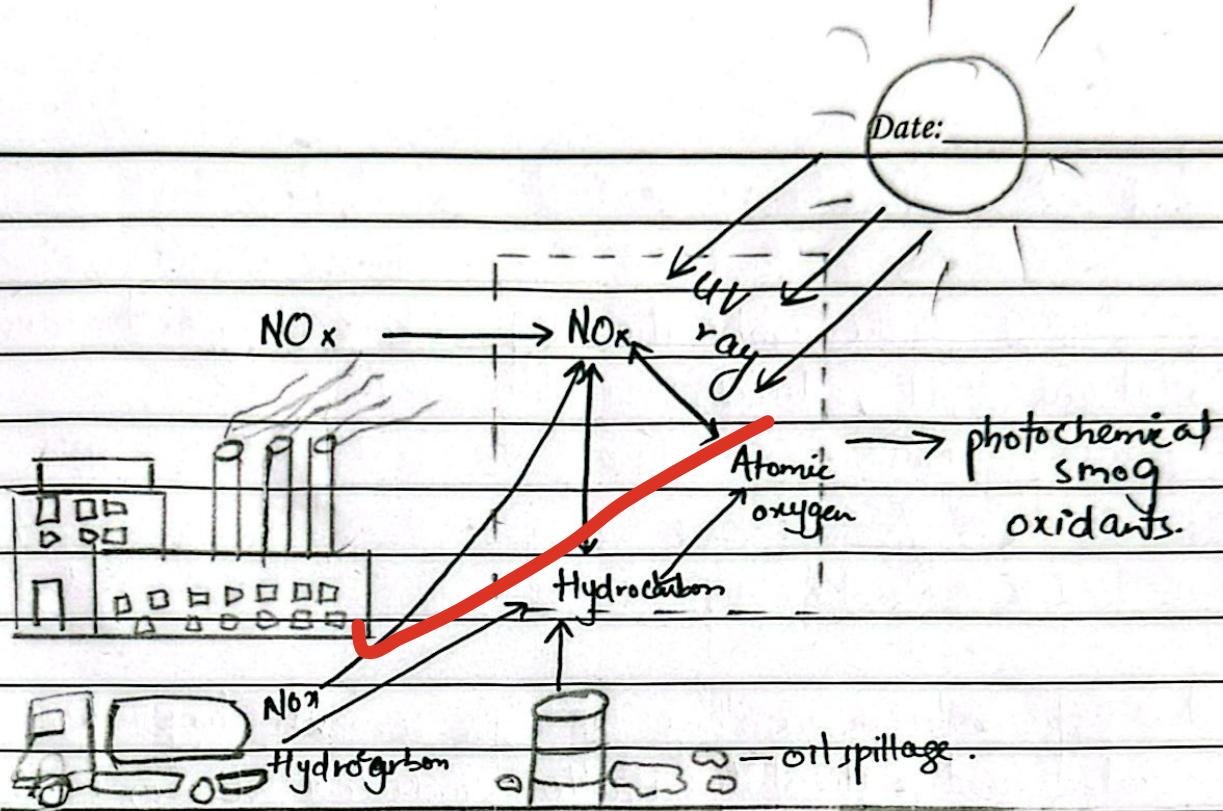
(SO<sub>x</sub> + Smoke + fog + Temp low)

It is formed when there is high concentration of sulphur dioxide and particulate matter produced due to combustion of fuels. If occurs in cold and humid climate. It is also known as London Smog and causes brownish colour of atmosphere.

2. Photo Chemical smog

(NO<sub>x</sub> + VOC's → Smoke + fog + Temp high)

Photo-chemical smog is a brownish-gray haze caused by the action of solar ultraviolet radiation on atmosphere polluted with hydrocarbons and oxides of nitrogen. It contains anthropogenic air pollutants, mainly ozone, sulfuric acid, and organic compounds, which are trapped under the ground by temperature inversion.



## Causes of Smog

1. Overpopulation is a significant cause of smog. More usage of agricultural products, industries, and transport increases pollution.
2. Fireworks also increase the level of air pollutants in the atmosphere.
3. The use of coal as a fuel has become a prominent contributor to the smog.

## Effects of Smog

1. The pollutants present in the smog enter human body through inhalation. It causes bronchitis, lung cancer and other respiratory disorder.
2. The pollutants in smog also cause skin cancer, skin rashes and reddening of skin can occur.
3. Road accidents increase because the visibility sometimes decreases by 1 km.

Q. NO 4 (D). Describe different causes of 'Tsunami'?

Is there any difference between a Tsunami and a tidal wave? Name the worst Tsunami ever recorded.

Answer:

### Tsunami

A series of waves that are produced due to the sudden disturbance under the water's surface is called a tsunami. These waves are harbour waves. These are also called seismic sea waves.

### Causes of Tsunami:

#### 1. Movement of Plate tectonics

It is the process, in which the tectonic plates slide over the other plates beneath them. Due to it, these plates sink into the earth's mantle. As a result, harbour waves produce and lead to tsunamis.

#### 2. Volcanic Eruption

Sometimes, tsunamis are caused by volcanic eruptions since the volcanic eruption, on the one hand, is responsible for raising the earth's temperature and on the other hand for the movement of tectonic plates.

#### 3. Collision of Meteorite in water

It is a very rare case when these harbour waves produce due to the striking of meteorite with the oceanic surface.

# Difference between Tsunami and Tidal wave.

Tsunami		Tidal Wave
These waves produce only due to geographical events: earthquakes	Defination	These waves produce only due to gravitational pull of the moon and sun.
Magnitude of tsunami is greater than equal to 7	Richter scale	No such implications in Tidal Waves.
High	Speed	Low.
More damaging	Destruction	Less energetic and destructive.

The most worst tsunami ever recorded

The worst tsunami was recorded in Indian Ocean-Sumatra, Indonesia in 2004. 300,000 people died in the disaster

overall good answers!!!!