Date

Question # 02

Answer # 02

(a)

1) Introduction

Volcanoes erupt due to several causes. Earthquakes are also leading causes of volcanic eruption. The activity in earth's plates trigger the volcanic eruption. Apart from earthquake there are several other causes too. However, the earthquakes in Iceland after series of small earthquakes triggered the volcanic eruption on 18th December 2023.

2) Several Causes of Volcanism or Volcanic eruption

There are five main causes of volcanic eruption including the earthquakes. These are explained in preceding paragraphs.

2.1) Plate Tectonics

The movement of plates (tectonic) is a major cause or factor in the formation of volcanoes. Volcanoes are commonly found at convergent plate boundaries (subduction zones), where the one tectonic plate is forced beneath another, causing melting

Signature

RG

No.

Date

of the sub-ducting plate. They can also form of divergent boundaries (mid-ocean ridges) where plates move away from each other, allowing magma to rise.

2.2) Hotspots

Hotspots are areas of abnormally high heat flow in the Earth's mantle that can lead to formation of volcanoes. As tectonic plates move over these hotspots, magma plumes can break through the Earth's crust, creating a series of volcanoes.

2.3) Subduction Zones

In subduction zones, oceanic plates are forced beneath continental or other oceanic plates. The intense heat and pressure cause the subducting plate to melt, leading to formation of volcanic arcs along the subduction boundary.

2.4) Mid-Ocean Ridges

Along mid-ocean ridges, where tectonic plates are spreading apart, magma from the mantle can rise to fill the gap, leading to formation of underwater volcanoes and seafloor spreading.

RC

No.

Date

2.5) Rifting

In areas where tectonic plates are moving away from each other, such as continental rift zones, the Earth's crust can thin and crack, allowing magma to rise and creates volcanic activity

3) Conclusion

Earthquake occurs because of activity of tectonic plates most of the time. It also triggers the already formed volcanoes and volcanoes erupt. The magma is thrown to the surface of the earth. Apart from earthquakes, the other causes of volcanic eruption are also mostly part of the tectonic plates' movement.

Signature

No.

Date

Question # 02 (b)

Answer # 02 (b)

1) Introduction

Big Bang theory and Big Crunch are opposite of each other. However, Big Bang theory is supported through some evidences and arguments. However, the Big Crunch is the hypothetical scenario. The main difference between both is that Big Bang theory argues about the evolution of the universe and Big Crunch defines the collapse of the universe. Lastly, the age of universe is defined through various factors like stellar evolution etc.

2) Big Bang Theory

Big Bang theory suggests that the universe originated from an extremely hot and dense state approximately 13.8 billion years ago. It suggests that the universe expanded rapidly from the initial singularity, and undergoing various stages of cooling

Signature

No.

Date

expansion, leading to the formation of galaxies, stars, and all the observable structures in the cosmos.

3) Big Crunch Theory

The Big Crunch theory is a hypothetical scenario in which the expansion of the universe reverses due to the gravitational attraction of matter, causing the universe to collapse inward. In this scenario, the universe will eventually reach a point of maximum density, similar to the initial stage before Big Bang theory.

4) Age of universe is determined Through various methods

Following are few methods through which age of universe is defined.

4.1) Observation of the Cosmic Microvave Background (CMB)

Scientists study the cosmic microvave background radiations,

Signature _____ RG No. _____

Date

which is the residual heat from the Big Bang. By analyzing temperature fluctuations in the Cosmic Microwave background, they estimate the age of the universe.

4.2) Observation of Distant Objects

Astronomers observe the distant galaxies, supernovae, and other celestial bodies to measure their redshift, which is the extent to which their light has been shifted towards longer wavelengths due to the expansion of the universe.

4.3) Stellar Evolution

The ages of the oldest stars in the universe provide constraints on the age of the universe. By analyzing the properties and lifetimes of these stars, astronomers can infer the age of the universe.

5) Conclusion

In a nutshell, the Big Bang Theory is about evolution or expansion and Big Crunch is

Signature

No.

Date

about the reverse process. Lastly, the age of universe is defined through Steller evolution observation of the distant objects and observation of CMB.

Date

Question # 02 (c)

Answer # 02 (c)

1) Introduction

Renewable energy sources offer sustainable energy which do not provide or contribute to the degradation of environment - like non-renewable energy sources. The leading renewable energy sources are solar energy, tidal energy, wind energy, hydro-electric energy and geo-thermal energy.

2) Renewable Energy Sources

Solare energy, wind energy, tidal energy, hydro-energy and geothermal energy are among leading sources of renewable and sustainable energy.

2.1) Solar Energy

Solar energy is extracted from the rays of sun - through photovoltaic panels or solar thermal systems. These solar panels converts solar energy into electrical energy. Solar

Signature

No.

Date

is abundant and widely accessible, and produces no greenhouse gas emissions.

2.2) Wind Energy

Wind energy is the energy which utilizes the kinetic energy of the wind to turn turbines which generate electricity. Wind turbines can be installed on land or offshore in windy areas to capture wind energy efficiently.

2.3) Hydropower Energy

Hydropower, Re or hydroelectric power, harness the energy flowing water to generate electricity. Hydropower plants rely on large plants like dam which act as reservoirs of water to keep generating the renewable energy.

2.4) Tidal Energy

~~Geo-thermal energy~~ Tidal energy is the energy which is generated from the oceanic waves and tides. The oceanic

Date

waves generates oceanic currents through intese tides in the ocean which generate the energy. ~~These~~ This is also extracted and used as the renewable source of energy.

2.5) Geo-thermal Energy

Geothermal energy harnesses heat from the earth's interior to generate electricity or provide heating and cooling. Geothermal power plants extract heat from underground reservoirs of hot water or steam and use it to drive turbines connected to generators.

3) Conclusion

These are the renewable sources of energy which offer the option of sustainable and reliable option of energy. These sources should be promoted in order to mitigate the risks of further climate risks. These sources can prevent the degradation of earth.

Signature

No.

Date

Question # 02 (d)

Answer # 02 (d)

1) Introduction

Optical fiber offer the better option for internet connection It is better than the carrent wire which is used. Optical fibers through the lights in the wire. The process is defined below.

2) Optical Fibers

Optical fibers are critical component of modern telecommunication systems, enabling the efficient and high speed transmission of data over long distances using light signals. They consist of the thin, flexible and transparent strand of glass or plastic, through which light pulses travel by a process called total internal reflection.

2.1) Operation of Optical Fibers

The transmission of data through which optical fibers

Date

on the principle of total internal reflection.

2.2) Components of optical fiber

There are mainly two components of optical fiber.

a) **Core**: The central part of the fiber through which light travels.

b) **Cladding**: The optical layer that surrounds the core and has a lower refractive index. It helps in keeping the light confined to the core through total internal reflection.

3) Conclusion

In conclusion, optical fibers are a revolutionary technology that has revolutionized the way we communicate and transmit data. Their efficiency, high data capacity, and reliability make them an essential component of the modern information age.

Signature

No.

Date

Question # 08 (a)

Answer # 08 (a)

So Data:

- Sum of consecutive numbers is 273.
- Consecutive Numbers ?

Solution:

The sum of consecutive numbers is 273.

Following are odd numbers:

$$89 + 91 + 93 = 273$$

Hence, 89 + 91 + 93 are three odd numbers whose sum is 273.

Date

QUESTION # 08 (b)

ANSWER # 08 (b)

(i)

Data :

4, 16, 36, 64, ? 144.

(ii) Data :

30, 29, 27, ?, 20, 15

Ans:

30, 29, 27, 24, 20, 15

iii) Data :

1, 7, 15, 25, ?, 51

Ans:

1, 7, 15, 25, 37, 51

iv) Data :

0, 2, 6, 12, 20, 30, ?

Ans :

0, 2, 6, 12, 20, 30, 42

v) Data :

48, 24, 72, 35, 108, ?

Signature

No.

Date

Question # 08 (c)

Answer # 08 (c)

(i) THRSI : Shirt

(ii) GNDREA : Garden

(iii) SCHAMOT : Stomach

(iv) ONL NDO : London

(v) HIODALY : Holiday