

Good for math portion
Enough length of theory portion
Enough headings
Fine diagrams

Volcano eruption

Q.2 (a)

Ans:

Synopsis

Introduction

- 1- Volcano eruption and earthquakes
- 2- Case of Iceland's volcano eruption
- 3- Causes of volcano eruption
- 4- Effects of volcano eruption
- 5- Conclusion
- 6-

1- Introduction:

The year of 2023 in volcanic activity witnessed sudden increase in volcano eruptions. Iceland and Indonesia have experienced severe incidents of volcano eruption because of earthquakes which allowed magma to come out to surface.

2. Volcano eruption after earthquakes:

Deep within the Earth, it is so hot that some rocks slowly melt and become a thick flowing substance called magma that rises in magma chamber. A series of earthquakes gives way to that magma to come over the surface of the Earth: Due to high pressure of gases magma quickly rises to surface.

3. Case of Iceland's volcano:

Since July, 2023, there has been a series of earthquakes in Iceland, a country widely considered a mantle plume a hot zone as its location on the earth. Such location causes earthquakes and creates a hotspot which enhances volcanic activity. Already occurring activity due to the spreading movement of the plates exacerbates situations. Since last december, Iceland has been experiencing volcanic activity after a series of earthquakes.

4. Causes of Volcano eruption:

For an eruption, enough magma must accumulate in the chamber under the volcano. The eruption is mainly triggered by spreading of plates of the earth, special which creates hotspot point for magma to come over the earth's surface. Third cause is pressure of explosive gases within a volcano or a landslide that removes material from the top of a volcano and paves way for flowing substance of magma.

5- Effects of volcano eruption:
Volcanoes spew hot, dangerous gases, ash, lava and rocks that are powerfully destructive for living beings. People die from volcano blasts with additional threats to health such as floods, mudslides, power outages, and wildfires.

6- Conclusion:
Volcano eruption occurs with a series of earthquakes specifically at a hotspot location of a country like Iceland. Spreading of plates of earth surface and pressure of gases present in a volcano cause volcano eruption.

Q.2. (b) Big Bang and Big Crunch, Age of the universe

Ans:

- Synopsis
- 1- Introduction
 - 2- The Big Bang theory
 - 3- The Big Crunch
 - 4- The Universe and gravitational force = Age of Universe
 - 5- Conclusion

1- Introduction

There are two key theories related to the expansion of Universe and gravitational force. The Big Bang and Big Crunch are the two concepts which have helped more about space and energy learning. These two theories have given the idea about the existence and age of the universe and regarded as ~~still~~ useful.

2- The Big Bang theory

Many scientists believe that we live in a finite expanding universe which has not existed forever and that all the matter, energy and space in the universe was once squeezed into a infinite small volume

which erupted in a cataclysmic explosion. This concept is known as Big Bang theory. All these matter, energy and space came to infinitely hot gravitational singularity and began expanding everywhere at once. This expansion of the universe is continued since that period.

3- The Big Crunch theory?

The Big crunch theory is a hypothetical scenario for the learning of the fate of the universe in which the expansion of the universe is based on reverse and recollapse pattern which ultimately causing the cosmic scale factor to reach zero. This phenomenon is considered as opposite to the Big Bang, whereas both ideas are presented to estimate the existence of the universe.

4. The Universe expansion and its age determination

The Big Bang theory is considered as theory of the birth of the universe. It is believed with the estimations of Big Bang theory and Big crunch phenomenon that the the age of the

universe is around 13.2 billion years. Expansion of the universe and extrapolating back to the Big Bang theory give ideas to the astronomers to estimate the age of the universe and actually followed the formula of expansion of the universe to determine its age.

5-

Conclusion

Astronomers have long been researching about the existence and age of the universe. The conclusion gave two ideas. First is Big Bang that points to expansion of the universe after an explosion. Second idea is of a Big Crunch which is based on hypothesis of expansion and recollapse of the universe. The expansion rate and ~~exp~~ extrapolating are the key factors which helped astronomers to estimate the age of the universe.

Q.12(c)

Five sources of Renewable Energy

Ans:

- 1- Introduction
- 2- Renewable energy
- 3- Five sources of energy
- 4- Conclusion

1- Introduction

Renewable energy is derived from natural resources. Such resources are friendly to environment - so their use is helpful for mankind. Wind power, solar power, bioenergy, tidal energy and hydroelectric are the renewable energy resources which are helpful to generate energy.

2- Renewable energy

Renewable energy as derived from natural resources is replenished at a higher rate than the consumption - It comes from a source that will not run out and can not cost climate change due to low or zero-carbon footprint. It is replenished on a human timescale. It includes sunlight, wind, water and geothermal heat.

Benefits of renewable energy

It produces no greenhouse gas emissions from fossil fuels and reduces some type of air pollution. It reduces dependency on imported fuels. It creates economic development and jobs in manufacturing and installation.

3. Five sources renewable energy

There are natural resources to generate energy which is friendly to environment.

i- **Wind energy:** Wind is the largest producer of renewable electricity in the US and the UK. It generates energy by spinning the blades of wind turbine.

ii- **Hydroelectric:** Power created using movement of flowing water is called hydroelectric. Such plants are found at dams and generate electricity through turbines.

iii- **Solar power:** Use of sunlight to store energy is called solar power. It generates electricity by capturing sunlight on solar panels that joint chemical and physical reaction.

iv- **Bioenergy : Biomass**

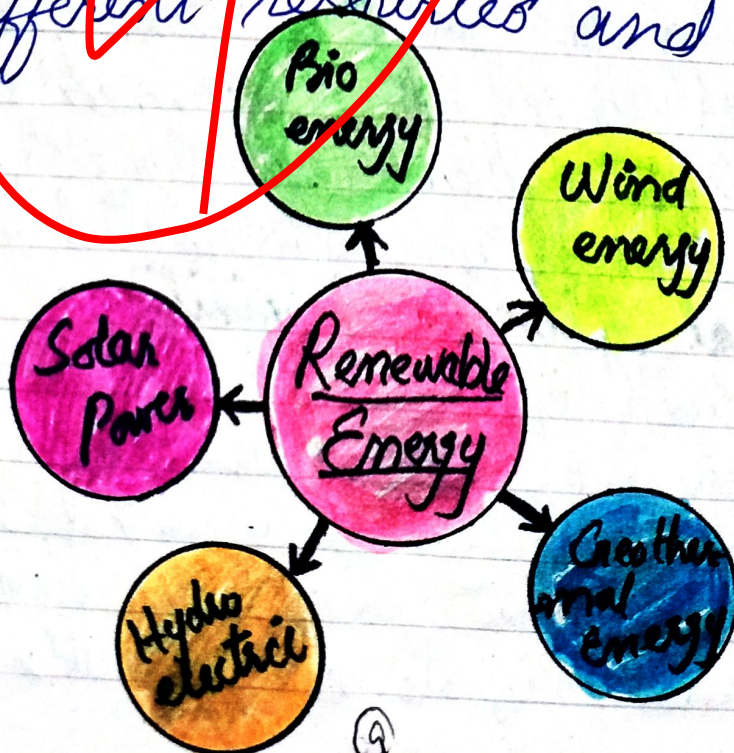
Organic matter that ~~burned~~ can generate electricity as a fuel source. These fuels are called biomass, and include anything from plants to timber to food waste.

v- **Geothermal energy**

It is the thermal energy in the earth's crust. It combines energy from radioactive energy and formation of the planet. It has been used as a source of heat-

4- **Conclusion:**

Renewable energy produce low to zero-carbon emissions and generated from natural resources which can not run out. It has different resources and benefits



Q.2 (d)

Optical fibers and their working process

Ans:

Synopsis

- 1- Introduction
- 2- Optical fibers: Definition
- 3- Optical fibers as Transmitters
- 4- Working principle of Optical fibers
- 5- Importance of optical fibers in daily life
- 6- Conclusion

1- Introduction

Fiber optics known as Optical fibers are strands made by glass. These are used as data transmission mod with different frequencies. Based on capacity and distance, optical fibers follow working principle of current speed with transmission limitation. They have changed the transmission processes with updated technology.

2- Optical fibers: Definition

Optical fibers are long thin strands of very pure glass about the size of human hair. They are arranged in bundles called optical cables and used to transmit signals over long distance.

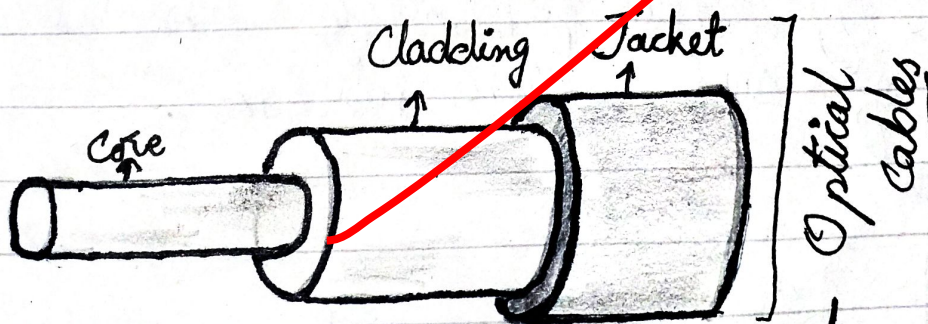
3- Optical fibers as transmitters

Optical fibers are arranged in cable form to work as transmitters at long distance. Internet connectivity lines are spreaded with the help of optical fibers which is called data transmission system to send information.

4 Working principle of optical fibers.

Optical fibers have low attenuation with very high Bandwidth and small size and low weight. They do not have electromagnetic interference. With electrical to-optical transducers, optical media and digital signaling principle to build a field for data processing. This process follows bundled cables patterns with three layers. Upper layer is called jacket, middle is called cladding and lower is called core.

Fiber Optics (Optical fibers)



Structure of inner layer

5- Importance in daily life:

Data transmission has become very quick and easy with use of optical fibers. With its multi and single mode optical fibers are used in devices for coding-sockets, transmitters, chips, internet cables, solar plates and very simple mediums of daily life are constructed with the help of optical fibers. Space engines and other messages conveying devices and transmitters are also performing tasks with use of optical fibers.

6- Conclusion:

Optical fibers as very thin and small strands are used to transfer data. These are made in bundles form and called optical cables. They have been considered very important because of their benefits in the field of data transmission.

Sec-II

Q.16

Ans:

(a)

Percentage of total votes

Data

3 candidates' votes = $15,000 + 10,000 + 8,000$

Total voters = $33,000$

Solution: Winning candidate received
 $15,000$ votes

Thus: $\frac{15,000}{33,000} \times 100 = \boxed{45.45\% \text{ Ans}}$
percentage of total votes

(b) Ratios of angles $3:4:5$. Each angle?

Ans:

Solution:

\therefore Angles are $3:4:5$

Let's suppose = $3x, 4x, 5x$

$3x + 4x + 5x = 180^\circ$ as sum of the angles of triangle.

Thus: $3x + 4x + 5x = 12x = 180^\circ$

$x = \frac{180}{12} = 15$

\therefore 1st angle = $3 \times 15 =$

2nd angle = $4 \times 15 =$

3rd angle = $5 \times 15 =$

$\boxed{\begin{matrix} 45^\circ \\ 60^\circ \\ 75^\circ \end{matrix} \text{ Ans.}}$

Q.6 (c)

Group of boys and girls with
4:6 ratio

Ans.

Solution

Data: Grouping with each group consist of 4 boys and 6 girls

No. of girls = 102

No. of boys = ??

Let's get number of groups first

No. of girls = $102/6 = 17$ groups
creation

Thus: $17 \times 4 = 68$ no. of boys
required

(d) Ratio of present ages: 6:7, Find age

Ans.

Solution:

Data: Present ratio: 6:7

After five years: 7:8

Present ages: ?

So, after 5 years ratio will be 7:8
Let's set the equation

Assume present age as $6x$ and $7x$

$$\therefore \frac{6x + 5}{7x + 5} = \frac{7}{8}$$

$$\Rightarrow 8(6x + 5) = 7(7x + 5)$$

$$\Rightarrow 48x + 40 = 49x + 35$$

$$\Rightarrow 48x - 49x = 40 - 35 = x = 5$$

So present ages are = $7 \times 5 = 35$ (B), $6 \times 5 = 30$ (A)

Q.18 (a) 3 odd number sum = 273
Find numbers

Ans: Solutions:

Let's suppose first odd number = x

2nd number = $x + 2$

3rd number = $x + 4$

Let's set equation:

$$\begin{aligned} x + x + 2 + x + 4 &= 273 \\ \Rightarrow 3x + 6 &= 273 \Rightarrow 3x = 273 - 6 \end{aligned}$$

$$x = \frac{267}{3} = 89$$

$x = 89$ 1st number

$89 + 2 = 91$ 2nd number

$89 + 4 = 93$ 3rd number

Three consecutive odd numbers = 89, 91, 93 Ans

(b) Missing numbers

Ans: i- 4, 16, 36, 64, ~~100~~, 144

Logic: Every number is added with addition of previous number's addition jumping by 8 numbers starting from 12.

Thus, $4 + 12 = 16 \Rightarrow 16 + (12 + 8) = 36$ and so on

ii- ~~30, 28, 27, 24, 20, 15.~~

iii- 1, 7, 15, 25, ~~37~~, 51.

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

v- 48, 24, 72, 36, 108, ~~48~~.

Q18 (c)

Correct words from jumbled spellings

Ans:

- i- THRSI \Rightarrow Shirt
- ii- GND REA \Rightarrow Garden
- iii- SCHAMOT \Rightarrow Stomach
- iv- ONLNDD \Rightarrow London
- v- HIODAY \Rightarrow Holidays

(d)

Age problem

Ans:

Data:

Sara's age = x

Mother's age = $6x$, Brother = $2x$

\Rightarrow In three years sum of their ages = 72
Finding present ages of three:

\therefore After three years sum = 72

So current sum is = $72 - 9 = 63$

Sara's age = x , Mother's age = $6x$

Ali's age = $2x$

So, $x + 2x + 6x = 63$

$$9x = 63 \Rightarrow x = \frac{63}{9}$$

Thus Sara's age = [7 years

Mother's age = [$7 \times 6 = 42$ years

Ali's age = [$7 \times 2 = 14$ years]

Ans.

Q.3 (a) Major hurdles for developing countries to tackle global warming: COP-28

Ans:

Synopsis

1- Introduction

2- Global warming to global boiling

3- Developing countries are failing to tackle the impacts: COP-28

i- Global forum: COP as weak forum

ii- Poor representation of developing countries

iii- Blame game of developed world

iv- Climate policies influenced by power lobbies and oil giants

v- COP-28: Phasing out fossil fuels

4- Developing countries must raise their voices to be heard

5- Conclusion

1- Introduction:

The world is witnessing rise in warming process of the earth as result of human activities. Developing countries with less than 20% of contribution are paying the cost of global warming because of their low presentation and burden shifting attitude of developed world. COP-28's final

draft is an example of such hurdles.

2. ~~Global warming to global boiling:~~

The world is getting warmer with rapid speed so the IPCC's recent reports have called that the earth is at the edge of global boiling - Extreme heatwaves, scorching heatstrokes, melting glaciers and heavy rains are pushing humanity to the age of polyerisis -

3. ~~Developing countries failing to tackle global boiling~~

Developing countries are paying heavy cost and are most vulnerable to the effects of climate change. African and Asian countries are at risks of rapid glacier melting, volcanic eruption and floods with water and food scarcity. Unfortunately they are failing to tackle with global boiling

1. ~~Poor representation~~

Developing countries have poor representation at international forums so can not present their grievances in proper manner. Their voice is not considered for making any

environmental policy. Their ~~poor~~ role at Climate conference is an evident. Recently, they fail to represent their vulnerabilities in COP-28.

ii- **Global forum: COP as weak forum**
Conference of Parties is held every year to address climate change problems and provide assistance to aggrieved parties. But it has become a very weak forum because its commitments and protocols are not followed by developed countries. Even it could not make state to give their due share to help the cause of climate change.

iii- **Blame shifting of developed countries**
Developed countries are responsible for high level of carbon emission and fossil fuel burning with 29% China, 32% the US and the UK and other countries. These countries used to shift the burden to other culprits to avoid the responsibility.

iv- **Influence of powerful lobbies:**
Powerful lobbies as industrialists and business giants have heavy influence on climate policies. This

is one of the key hurdle that makes COP commitments ineffective and leaves developing countries in the state of mercy.

(V) Phasing out fossil fuels:

Recently in December 2023, the US pulled out phasing out fossil fuels from final draft of the COP-28. This act has made situations more worsening as fossil fuels burning is the key cause of rising global warming.

4. Developing countries must raise voice:

The vulnerabilities of developing countries have made climate change a threat to their existence. They must raise their voice on the environmental forums such as COP. By doing this they may get a help and way to deal with the burdens of global warming.

5. Conclusion:

The world is headed to the age of global boiling and developing countries are the core victims of it and they are unable to make the world listen their cry.

Q.3(b)

Balanced diet

Ans:

- Synopsis
- 1- Introduction
 - 2- Concept of balanced diet
 - 3- Importance of balanced diet
 - 4- Components of balanced diet
 - 5- Benefits of balanced diet
 - 6- Conclusion

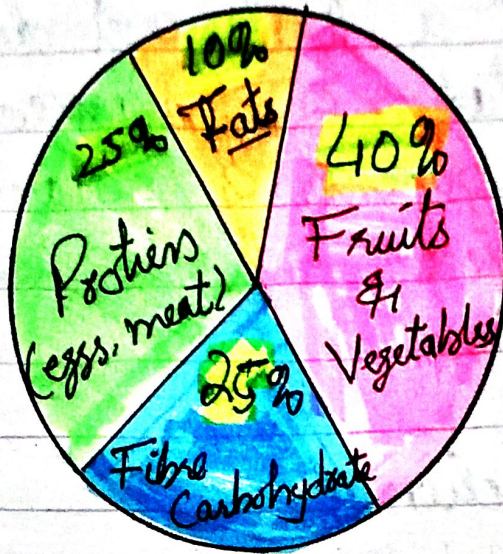
1- Introduction

Balanced diet means intake of certain food to keep growth and nourishment of body. It gives certain proportion of fats, acids, lipids, proteins, fibre, carbohydrates to body to grow properly. Such diet gives strength and maintenance to a human body.

2- Concept of balanced diet:

Balanced diet is a diet that contains certain kinds of foods such as rich in protein, fibres, carbohydrates, minerals and fats in certain quantities and proportions so that requirement for calories, proteins, minerals, vitamins and nutrients to endure the short length of lifespan. It allows a body to nourish in proper way.

Balanced Diet Chart



3- Importance of balanced diet.

Balanced diet that emphasizes on a ratio of nutrients as 10% of fats, 40 fruits and vegetables, 25% fibre and 25% proteins give a maintained sphere of growth of a human body. It gives a healthy life style and prevents sickness and keeps body away of disease. With strong metabolism a body fights diseases.

4- Components of balanced diet

Nutrients with required proportion are components of balanced diet. It includes vitamins, fibres, carbohydrates, protein, minerals and lipids. Such components

along with different fats collectively called components of a balanced diet. These components are further subdivided in groups as per their functions and qualities.

5- Benefits of balanced diet:

Balanced diet nourishes a healthy body with strong metabolism. A strong metabolism is capable of fighting against disease and help a healthy body to remain strong. Balanced diet decreases the risks of less life expectancy by giving a maintained strength to a human body.

6- Conclusion

Required nutrients are collectively called balanced diet which helps in growing of a healthy body. It is very essential to have balanced to avoid the risks of diseases. It makes strong metabolism of human body.

Q.3 (c) Machine learning, AI and revolutionized world

Ans:

- 1- Introduction
- 2- Understanding machine learning as subset of AI
- 3- Machines with intelligence
- 4- AI and today's world
 - i- Automation
 - ii- Natural language processing
 - iii- Recognition power
 - iv- New ways of interactions with media
- 5- Myths and fears of AI
- 6- Conclusion

1- Introduction:

Artificial intelligence, a moderate form of technology has given machines the features of humans as intelligence. As a subset of AI, machines have revolutionized the today's world.

With unique features, AI has also raised myths and fears but its responsible use is one of the most popular debate.

2- Learning about machine learning:

Machine learning has become more

quick and sharp with Artificial intelligence which has given news for machine generations - With help of AI, machines with more responsive features are possible to be generated. Data processing, communication and innovation of devices are getting more glamour and highlights because AI has revolutionized the today's world with coding language and human intelligence.

3. **Machine with feature of intelligence**

The feature of human intelligence is now embodied with machine due to innovative and revolutionized ways of generating machines. Such machines are more adaptive, active and quick processing. Such features have changed the meanings of technology.

4. **Revolutionization with AI**

Artificial intelligence with its novel and more powerful innovations has overstepped its bounds. It has revolutionized the today's world and the ways of interaction with media.

i- **Automation:**

Automation power of AI generated

machines have made them independent. Now machines are being interlocked with self-processing features which was never before today possible -

ii- Natural language processing

Artificial intelligence generated machines are equipped with natural language processing. It allows them to learn human interaction skills and become more active and responsive. Such features of machines have changed the ways of communication.

iii- Recognition power

The revolutionizing of technology comes with recognition power. As AI generated machine system has the power of face, finger and ID recognition. This innovation has changed the mode of interaction of media.

iv- Revolutionized ways of interaction with media

The interaction of media has found in edges and ways which are very innovative. Touch sensors and scanning to copying of human qualities are very

novel. Artificial intelligence has strengthened and changed the modes of interactions with media. Roberts and mediums have made new ways of interaction with media.

5- ~~Myths and fears about AI~~

~~There have been many myths and fears about the usage and use of Artificial intelligence. Many believe that AI will empower humans and fears are of being humans' servant of machines. The facts are obfuscation because really strengths and powers of AI are still to be revealed.~~

6- ~~Conclusion:~~

~~Machine learning is the subset of Artificial Intelligence. By its innovative technology and inventions, it has revolutionized the today's world. Today the means of interaction with media are more confusing and ambiguous. More miracles of AI are still to be revealed. AI may not replace humans but humans with AI skill may replace humans those without skills.~~