Improve content
Make headings in the answers
Keep length of all questions equal
Understand the question carefully
Draw flow charts
Use scientific terminologies
Use scientific examples
Follow step by step method for maths problems
The answers are insufficient to fulfill the required criteria of the question and marks.
Work hard.

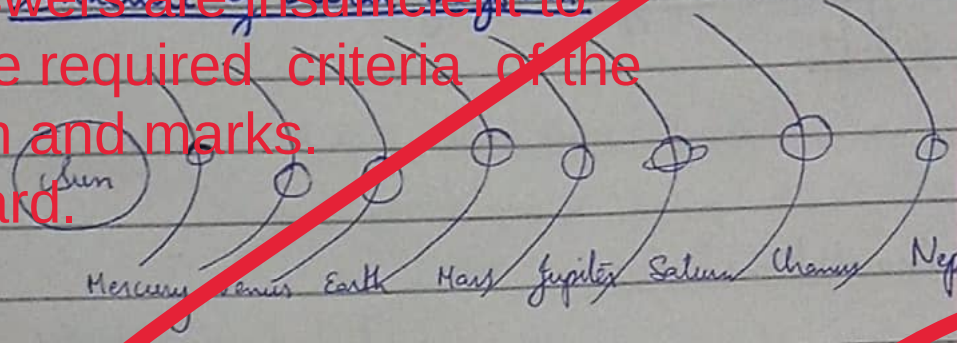
24600 Dilsam Ames Batch - 066 Mock

General Science and Ability

Q4- a. Solar System:

The Solar System consists of eight planets; Mercury, Venus, Earth, Mars, Saturn, Uranus, Jupiter and Neptune; five dwarf planets; moons and variety of smaller objects such as asteroids and comets.

Structure of Solar System:




1. Sun:

Sun is a star which provides us light and heat. Gravity of sun is 274 $m/s^2$. The mass of the sun is $2 \times 10^{30}$ kg. It compose of Hydrogen (74%) and Helium (24%) and some other elements as well.

2. Planets:

There are total of eight planets where Mercury, Venus, Earth and Mars are inner planets characterized by rocky surfaces and relatively smaller in size and Jupiter, Saturn,

Uranus and Neptune are outer planets, composed of hydrogen and helium gases.

3. Kuiper Belt:

A region beyond Neptune's orbit, containing many small, icy bodies.

4. Oort Cloud:

A distant, spherical shell surrounding Solar System, comprising icy bodies and comets.

## Key Features of Solar System:

1 Orbits:

Planets and other objects follow elliptical orbits around the Sun.

2- Gravitational Force:

The gravity of Sun holds the Solar System together.

3- Diversity of Planets:

Each planet has unique characteristics, such as atmosphere, temperature, and geological features.

Solar Systems could be explored by telescopes and by sending spacecrafts into the space.

b) Pituitary Gland:

Pituitary gland is a master gland. It is located in the hypothalamus of the brain. It is of a seed of pea size and weight is of 0.5 grams. It is divided into three lobes:

1. Anterior Lobe
2. Median Lobe
3. Posterior Lobe

1. Anterior Lobe:

It releases multiple hormones which includes:

i- Somato-Trophin Hormone: It also known as growth hormone, it is for the growth process. Its deficiency leads to dwarfness and excess to gigantism.

ii- Thyroid Stimulating Hormone: It activates the thyroid gland.

iii. Adeno Cortico trophic Hormone: It activates the adrenal glands which are on the top of the kidneys.

iv- Gonadotropic Hormone

v. Follicle Stimulating Hormone:

vi- Luteinizing Hormone

vii- Prolactin

} Roles in the Reproductive System

2. **Median Lobe:**

It releases the only hormone, Melanophore stimulating [illegible]. It is in skin cells; melanocytes, a brown pigment. Melanin releases to give skin colour. Excess production leads to [illegible] darkening of the skin.

3. **Posterior Lobe:**

It does not release its own hormone but acts as a store house. For example, antidiuretic hormone or Oxytocin (during [illegible]).

Therefore, Pituitary gland is the major gland that activates the other major glands of the body according to their requirements.

c. **Differences of RAM and ROM:**

Both are the two types of computer memory but they serve distinct purposes and have different characteristics.

| RAM (Random Access Memory) | ROM (Read only Memory) |
|---|---|
| i. It is volatile in nature; RAM losses data when the computer is powered off. | It is non-volatile; ROM retains its data even when the computer is powered off. |
| ii. RAM holds the data temporarily. | ROM stores data permanently. |
| iii. RAM allows access to data | ROM is slower than RAM, as it is designed to store data for permanent storage |
| iv. RAM can be upgraded | ROM is typically not upgradable |

**Offline: Nibble, USB and Motherboard**

**Nibble:**

Nibble is basic memory unit of

1 Nibble = 4 bits

**USB** (Universal Serial Bus):

These are the electrical devices through which CPU communicates with other parts of the computer.

**Motherboard:**

Motherboard allocate power to different parts of the computer.

d) COP 29 targets to limit the temperature rise:

Temperature rises or increase in the temperature of earth leading to rise in global warming which is effecting the environment, social, political, and economical life.

The Consequences includes:

1. Threat to life: The intensification of heat waves resulting in more deaths. For example, only Karachi has faced 1200 deaths in last 3 years due to heat.
2. Global ice loss: Glaciers are melting at a higher speed.
3. Rising global sea levels: Resulting in loss of habitats by more coastal flooding.
4. Ecosystem disruption: Loss of biodiversity, collapse of ecosystems and disruptions of food chains.
5. Agricultural effects: more crop loss, more food insecurity.
6. Health effects: more cases of dengue, malaria, typhoid etc. According to WHO; 3.5% dengue, 3% malarial and 3% typhoid cases rise due to global warming.

Achieving the 1.5C target requires immediate and collective action from governments, corporations, and individuals.

Measures to achieve the target

1. Transitioning to renewable energy: Phasing out fossil fuels and working on renewable energy sources.
2. Energy efficiency: Improving energy efficiency in buildings, transportation and industry.
3. Electrification of transportation.
4. Carbon capture and storage.
5. Sustainable land use: implementing sustainable agricultural practices, reforestation, and conservation efforts.

The success of COP 29 and the 1.5°C target hinges on the willingness of nations to work together, share knowledge, and implement concrete actions to reduce greenhouse gas emissions and mitigate the worst impacts of climate change.

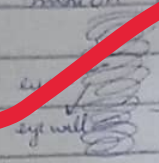
Q5-a) Sea Surface temperature rise:

Sea surface temperature rise refers to the increase in the temperature of the oceans surface waters by ocean absorbing the 90% of the excess heat trapped by

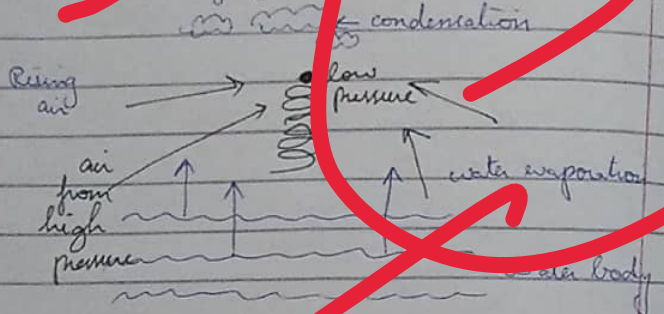
greenhouse gases.

**Formation of Tropical cyclones:**

Cyclone is a system of rotating winds around a low pressure area due to pressure gradient & coriolis effect of spin motion of the earth.




The cyclones formed on the surface of the sea due to rise in temperature are due to the pressure gradient.

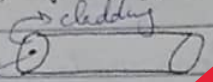



With the rise in temperature, water evaporates and then condenses to form clouds where temperature falls. Due to condensation, heat is released, thus creating a low pressure area in between the water body and clouds where the air moves in from high pressure and cyclone is formed.

b) **Optical Fibre:**

Opticals are the strands of glass used to transmit light signals from one point to another point in telecommunication.

Parts of optical fibre:

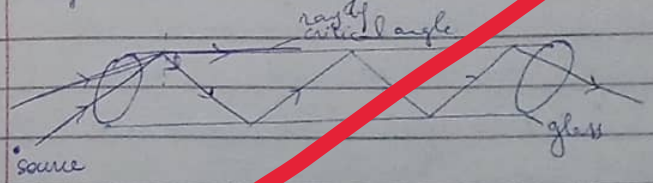



① Core is the central part and has high density. It has high refractive index.

② Cladding surrounds the core and has low refractive index and low density as well.

**Working of Optical Fibre:**

It works on the total internal reflection phenomenon. After critical angle we attain total internal reflection. Critical angle is angle of incidence at which angle of refraction becomes equal to 90°.



When light enters from the source and at the angle above the critical angle then the total internal reflection in glass takes place after which with the help of reflection phenomenon it travels in the glass and finally reaches its final point. And those light signals are converted into an electrical signals.

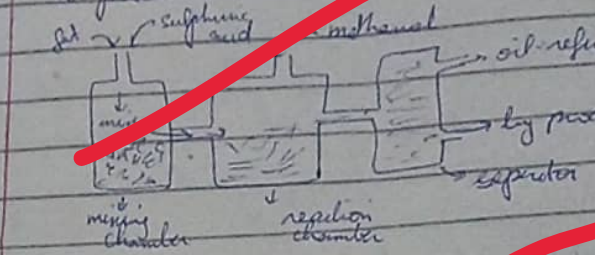
c) Microorganisms help in meeting current fuel shortage by producing biofuels, such as biodiesel, bioethanol, and biogas.

Biofuels are derived from biological materials such as plants waste, animal waste, crops remains, sugar rich sources, oily plants, food waste etc. and microorganisms helps in the processes

Biodiesel:

The raw materials used for biodiesel are oil resources such as fat mixed with sulphuric acid, then methanol added as a catalyst to speed up the process and lastly oil is refined.

Microalgae like chlorella convert sunlight and carbon dioxide into lipids which can be processed into biodiesel.

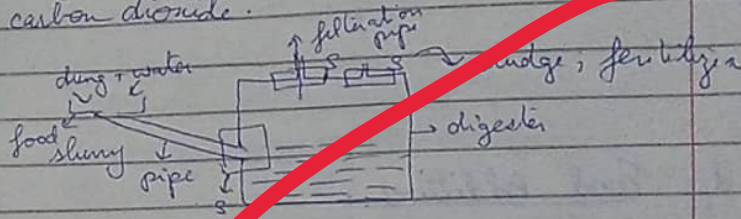



In final stage:

oil = Refine + additive (standard oil)

Bio gas:

Raw materials used are organic waste. Bacterias breakdown organic waste like sewage and agricultural residues to produce biogas which is primarily methane and carbon dioxide.




Bio-ethanol:

Resources or raw materials used are sugar rich sources. Steps to produce bio ethanol are; miling, ~~fermentation~~ fermentation, filteration and refinement. Yeasts (micro-

organisms ferment sugars and starches to produce ethanol which can be blended with gasoline.

Therefore microorganisms plays a major role in making of biofuels which can meet the current shortage of fuels. Biofuels are more environment friendly and can cope up the shortages.

Limitations in which microorganisms cannot meet the fuel shortage:

Shortcomings includes the raw materials availability. Raw materials are limited and if all of the resources would be used for biofuel production, it would lead to biodiversity loss.

Production of biofuels are costly specially biodiesel and requires modification in engine designs.

d) **Food Additives:**

These are substances added to food products to enhance their flavor, texture, appearance, or shelf life.

**Types of Food Additives:**

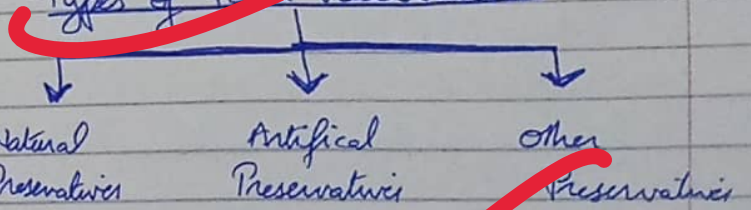
1. Preservatives: For preventing spoilage and growth of harmful bacteria.
2. Colourings: For enhancing or restoring colour in food products.
3. Flavours: For intensifying and modifying flavours such as for sweetness
4. Sweetners: Adding sweetness without calories.
5. Emulsifiers: Stabilize mixtures of oil and water.
6. Textureizers: Modify texture & prevent separation.

Some food additives have raised health concerns, so it is essential to check food labels and consume processed foods in moderation.

**Food Preservatives:**

These are substances added to food to prevent spoilage, extend shelf life, and maintain nutritional value.

**Types of Food Preservatives:**




Natural Preservatives:

1. Salt: inhibits bacterial growth
2. Sugar: prevents bacterial growth by

dehydrating cells

3. Vinegar : acidic nature inhibits bacterial growth.

4. Lemon juice : naturally preserves food.

**Artificial Preservatives:**

Prevents fungal and bacterial growth such as sodium benzoate, potassium sorbate, BHA etc.

**Other Preservatives:**

Nitrates and nitrites, Ascorbic acid and Sorbic acid. Also freezing, canning, dehydration are methods.

**Benefits and Risks:**

**Benefits:**

1. Extend shelf life
2. Prevent foodborne illnesses
3. Maintain nutritional value.

**Risks:**

1. Potential health risks
2. Impact on gut health
3. Overuse can lead to resistance.

## Section B.

Qb a) Depreciates 10% each year.

After 3 years = ?  3 years ago = ?

Present value = 8748

After one year 8748 - 0.1(8748)

= 8748 - 874.8 = 7873.2

After 2 years = 7873.2

Depreciation = initial price $(1+rt)^{-t}$

$8748 = x(1-0.1)^3$

$8748 = x(0.9)^3$

$(0.9)^3$

$x = 12000$

b) $F = 4D$

$F + 5 = 8(D+5)$ 5 years

$4D + 5 = 3D + 15$

$4D - 3D = 15 - 5$

$D = 10$

$F = 4D = 40$

After 10 years (5+5)

$F = 40 + 10 = 50$

$D = 10 + 10 = 20$

Ratio $= \frac{50}{20} = 2.5$

Father is 2.5 times age of his daughter.

c) Volume of football $= \frac{4}{3}\pi r^3$

$= \frac{4}{3}\pi(12)^3$

$= \frac{4}{3}(1728)\pi = 2304\pi$

d) 1. $L_1 = S_1 \times 27$ (Train 1)

2. $L_2 = S_2 \times 17$ (Train 2)

23 sec is to cross each other

Relative speed = $S_1 + S_2$

$L_1 + L_2 = (S_1 + S_2) \times 23$

$(S_1 \times 27) + (S_2 \times 17) = (S_1 + S_2) \times 23$

$27S_1 + 17S_2 = 23S_1 + 23S_2$

$4S_1 = 6S_2$

$\frac{S_1}{S_2} = \frac{6}{4} = \frac{3}{2}$

Ratio of speeds = 3 : 2

Q-7 a) $30 = \frac{x + x+1 + x+2 + x+3 + x+4 + x+5 + x+6}{7}$

$x = 16$

$x+6 = 24$ — Largest

b) C is A's father nephew. This makes C [illegible] of A. D is A's cousin not brother of C. Since both C and D are cousins of A, hence D & C are also cousins.

c) i. 4, 18, ___, 100, 180, 294, 448.

ii. 1, 2, 10, 37, 101, 226

iii. 11, 17, 37, 85, 163

iv. 13, 24, 46, 90, 178, 354

v. 4, 36, 144, [illegible], 900

d) A : B : C : D → 9 : 18 : 12 : 16

A & D's share $16x - 9x = 7x = 2240$ $[x = 320]$

D's share = $18x$ - [5760]