

General Science

PART-1

- | | |
|----------------------------------|--------------------|
| (1) Oxygen transport | (2) Glacier Caps |
| (3) Liver | (4) Ethanol |
| (5) Convert most energy in light | (6) Vitamin D |
| (7) Flash memory | (8) Fuzzy logic |
| (9) Ohm | (10) 8-15 km |
| (11) Plutonium | (12) Hydrogen bond |
| (13) Nephron | (14) Hemoglobin |
| (15) Crust | (16) Marine Biota |
| (17) Kyoto Protocol | (18) Iris |
| (19) Cyclone | (20) Rat flea |

PART-II

Section - I

Answer to 2 Question No

(A) Main Components of Cell and
Their mutual Functions

(i) Main Components of cell

A cell comprises of a following
main components.

a. Cell Wall

b. Cell Membrane.

c. Cytoplasm

d. Nucleus

e. Vacuole

f. Centrioles

g. Ribosomes

h. Endoplasmic Reticulum

i. Cilia

j. Flagella

k. Mitochondria

l. Plastids

m. Golgi bodies

n. Lysosomes

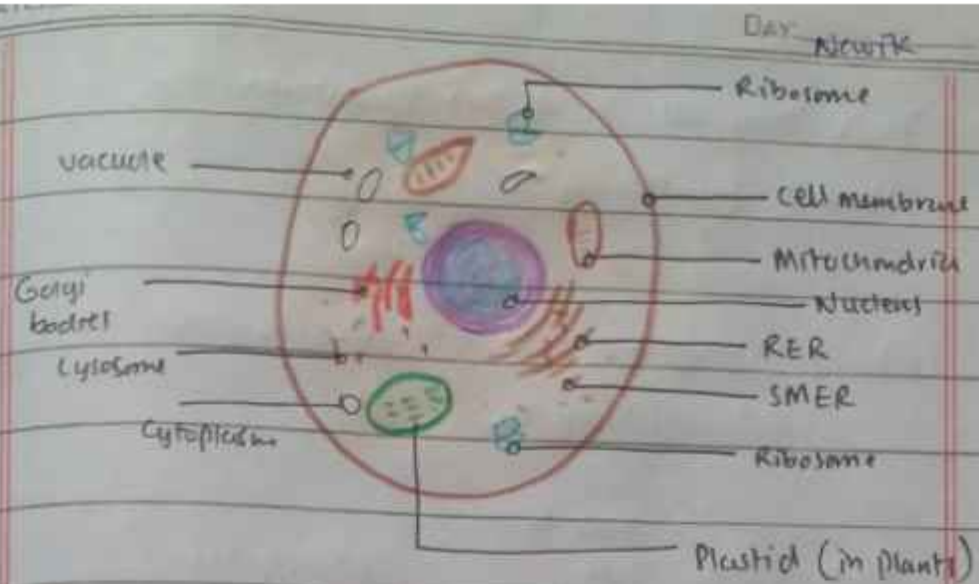


Fig (a) : Animal Cell

(II) Maintaining cellular function

All these Organelles work together to maintain the cellular function.

- Nucleus contains the genetic material
- Sends mRNA for Protein Synthesis.
- Ribosome make Proteins
- Proteins build up structures of cells
- Mitochondria is a power house of cell and generates ATP
- Cell membrane allows exchange of materials.
- These materials can stored in vacuole.

Thus they all to gether maintain the normal functioning ~

(B) Difference between Prokaryotic and eukaryotic cell

Prokaryotic cell

Eukaryotic

(i) Does have true nucleus

Does have true nucleus.

(ii) DNA is scattered

DNA is in nucleus

(iii) They are unicellular

They are both

(iv) Eg: Bacteria

Eg: Human cell, Paramecium.

(C) External Stimuli and Homeostasis

(i) cell response to external stimulus via chemical and electrical impulses. Chemical impulses are felt across cell membrane

where cell response differently to different chemical. Electrical response to stimulus is given via neurons i.e. motor neurons.

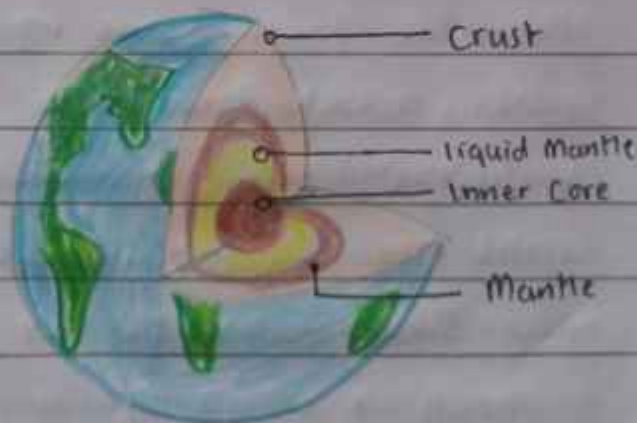
(iii) A cell maintains homeostasis by the exchange of materials. Endocytosis, exocytosis, osmosis and diffusion etc help cell maintain homeostasis.



Q-2 (c)

(A) Layers of Earth and Interaction

(i)



These are the layers of earth according to the most acceptable

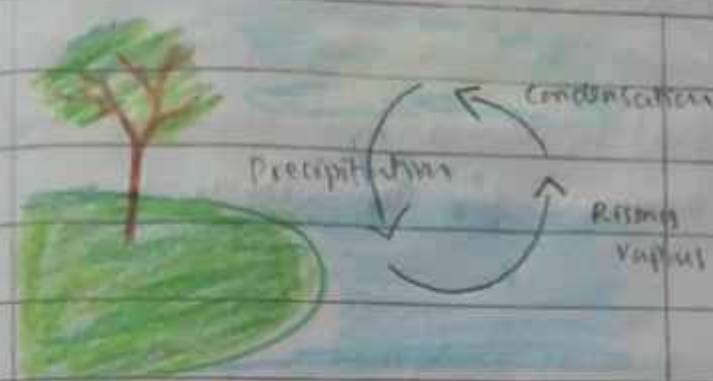
model based on S and P seismic waves. Other models have different layers with different names.

(ii)

They interact with each other via the forces of pressure and temperature. High pressure and temperature provided by upper layers keep the inner layers liquid following different rock changes. Besides that, Sills, dikes, laccoliths and batholiths beneath surface become sources for earthquakes and volcanic activities.

The inner layer forms igneous rocks, which turn into metamorphic and sedimentary rocks. The layers in crust push slide each other or converge or diverge following seismic activities.

(B) Earth's Water Cycle



(i) In the given time slot, earth water cycle can be explained as a cycle by which the fresh water rises, or condenses and precipitates maintaining the ocean bodies and water table.

(ii) Water Cycle supports life by maintaining a leveled water body beneath earth surface and maintaining water in the ocean. Ocean water serves as a source and ecosystem for marine life, while underground water forms

Rarest forms which are habitats
for organisms like Albino fish.
Further more this under ground
water is used by plants for
photosynthesis and consumed by
humans for homeostasis.

(C) Human activities impacting the Ecosystem and resources

First Principle Fault

Nature made Honey; man made Sugar
Nature made water; man made Pepsi
Nature made Sex; man made Porn
Nature made air; man made Pollution
Nature made peace; man made war
Nature made estrogen; man made Steroids
Nature sent books; man made facebook
Nature made sleep cycle; man breaks sleep cycle
Nature made adventure; man made video games
Nature made wood; man made plastic
Nature made iron; man made typhoon.

This shows the distorted image of

man and his destruction of natural ecosystem and phenomena. It is represented here in concise form which represents the whole scene of destruction caused by humans to the natural resources and world.

Answer to 3

Question No

(A) Big Bang Theory

Big Bang theory posits that the whole universe was contained in single point, hotter and denser than any thing imagined, which all of a sudden burst; out of which the whole universe is formed.

Origin and evolution of Universe.

- a. The origin of Universe is 13.7 billion years old.

- b It was followed after the big bang phenomenon.
- c The point burst and converted energy into matter and anti matter
- d They cancelled each other.
- e Some were left behind.
- f In one second proton and electrons neutrons were born
- g In three minutes it cooled down to ^{1 billion} ~~30,000~~ °C
- h H_2 and He were formed
- i In 500,000 years it cooled
- j down to $3000^\circ C$
- k Matter started interactions and leuciforms were made.

(B) Dark Matter and Dark Energy

According to the Big Bang theory universe is expanding at a constant rate. Dark matter and Dark energy are responsible for the

expansion of the Universe.

about 27% of the Universe is made of dark matter. Albeit, its composition is unknown, it performs the basic functioning of Universe expansion.

About 68% of the Universe energy is dark energy.

It acts as a gradient against gravitational force, thus expands the Universe. Its composition is also unknown as space and vacuum etc; though it performs major role in the expansion of Universe by countering the gravitational force.

(C) Evidences of Big Bang.

(i) Red and Blue wave Evidence.

When something moves away from earth, the light it

emits shift to red zone owing to dopplers effect. on the other hand it shifts to blue, if the object is coming closer.



Most of objects emit red light providing proof that Universe is expanding.

(ii) Micro waves Residue

Micro waves residue in the celestial places is the evidence that some energy has been scattered around after the big explosion, proving big bang theory.

Q.3 (d)

(A) Brain structure

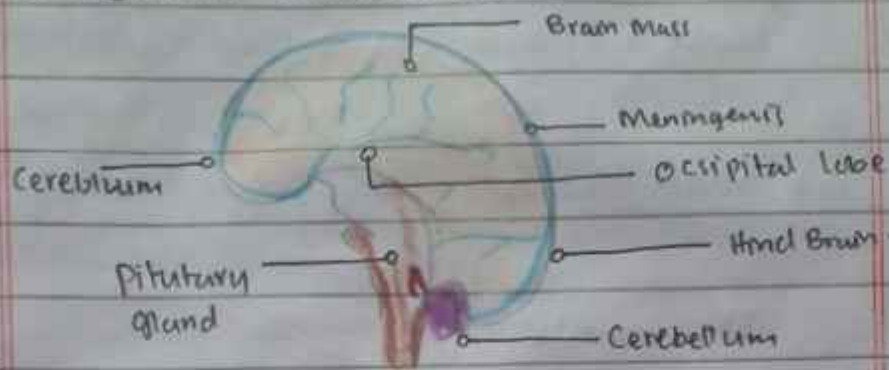


Fig : Human Brain

(i) Front Brain

Fore Brain comprises of Hypothalamus, Amygdala, Thalamus and Hippocampus. The main function of the frontal brain is cognitive activities, reasoning, short term memory and long term memory and movement of limbs.

(ii) Mid Brain

Mid Brain is much reduced in mammals. It consists of

medulla. It coordinates the front brain and hind brain. The functions of mid brain are auditory and visual sense.

(iii) Hind Brain

It consists of:

- a. Pons
- b. Cerebellum
- c. Medulla oblongata.

→ Pons Controls Sleep Cycle

→ Cerebellum is the second largest part of Brain. It performs the function of muscle coordination.

→ Medulla oblongata is associated with involuntary actions like sneezing and heart beat, respiration etc.

(B) Functions of Brain.

Brain is the controller of human body. It performs voluntary and involuntary functions.

Voluntary functions

Voluntary functions are those which are under the control of human. For instance walking, sitting, thinking etc. This function of brain is much developed in human as compared to other primates, making them unique and advance. The complex neural network leading to voluntary thinking brought here all movements in the modern and science.

Involuntary functions

Involuntary functions are those which happen by their own.

and are not under the control of humours. For instance: Heart beat, Respiration, Reflex actions, Sweating, digestion, Homeostasis etc. these are all involuntary functions of Brain.

(C) Factors affecting brain Functions.

Dr. Aziz Sancar from Turkey won Nobel prize in biology for discovering the effects of sleep, nutrition and stress on the functions of Brain.

Biological Clock

Aziz Sancar studied biological clock of humans and genetic level and found that:

- (1) Nocturnal behaviour can reduce Cognitive Skills.

- (iii) Wakening till late night may cause impairment
- (iv) Taking stress causes rapid Secondary aging.
- (v) Stress causes malfunctioning in the Voluntary functions of Brain.
- (vi) Nutrition can boost and reduce the memory storage capacity.
- (vii) Sugar reduces this capacity.
- (viii) Olive oil increases memory storage (Madrid Olive association)
- (ix) Ozempic, a weight loss drug may cause total loss of memory.
- (x) Fenestrol, a hair medicine, effects hypothalamus and pituitary gland, causing infertility.

DATE _____

Ansewer to 4

Question No 4

(A) Optical Fiber and its Activity

(i) Structure



Fig : Cross section of optical Fibre

(ii) Working

Optical fibres work on the principle of total internal reflection. It is a phenomenon in optics according to which light can bend within a medium at certain angle. That angle is called as refractive index. Water has its own refractive index. If light

DAY: _____
Falls on it at that angle it is reflected back. Same mechanism is adopted in optical fibres. Electric impulses are converted into light which when travel through optical fibre, internally reflect and travel over long distances. On the other end these impulses are collected and are converted in electric data again.

(B) Advantage of Optics fiber over Copper wire.

- i They are secure and data theft has slim chance.
- ii they don't interact with external magnetic field hence data flow uninterrupted.
- iii They are cheap price Copper is expensive.

iv Data flows through optic fibre with greater speed as compared to copper wire.

v It is light weight and hence more practical. 1 kg of fibre optic can spread over area of 1600 km^2 i.e. 40 km in length.

vi They are corrosion resistant hence allowing sustenance at cheap price.

(c) High speed data transfer

Fibre optic allow high speed data transfer owing to low or negligible resistance in its medium. The electric signals are converted to light waves which travel all along fibre and are converted to electrical signals again. As speed of light is $3 \times 10^8 \text{ km/s}$, it is a high data transfer.

Q.4 (c)

(A) Balance Diet

(i) Balance diet is a diet which contains all essential nutrients required for normal functioning of a body.

These are:

- a. Carbohydrates
- b. Proteins
- c. Dietary fibres
- d. Vitamins
- e. Amino Acids
- f. Minerals
- g. Lipids
- h. Fats etc.

(ii)

Balance diet is essential for maintaining good health.

Lack of any nutrition results in malnutrition which can

Cause several diseases in children
malnutrition can cause

(i) Marasmus

(ii) Kwashiorkor

In adults it causes several diseases,
each specific to nutrient that
body is lacking.

(i) Vitamin A deficiency $\rightarrow$ vision loss

(ii) Vitamin B₁ deficiency $\rightarrow$ Beri Beri

(iii) Vitamin C deficiency $\rightarrow$ Scurvy

Similarly hair loss, memory loss
and abnormal function of visceral
organs is also caused by malnourished
diet. That's why balanced diet
is very important.

(B) Macro and Micro Nutrients

(B) Macro Nutrients

- ① Calcium
- ② Chlorine
- ③ Magnesium
- ④ Phosphorus
- ⑤ Potassium
- ⑥ Sulphur
- ⑦ Sodium

(B) Micro Nutrients

- ① Copper
- ② Fluorine
- ③ Iodine
- ④ Iron
- ⑤ Selenium
- ⑥ Zinc

(D) Diet prevent Chronic Diseases

- ① Dates contain Selenium which is not found in any other fruit or vegetable. Selenium is

1 Anti Cancerous: Thus eating dates protect against cancer.

② Cucumbers contain fibre, thus prevent from gastrointestinal disease

③ Carrot is anti cancerous.

④ Olive oil controls diabetes and we live good on. Thus a diet and balanced diet can prevent many chronic diseases.

Answer to 5

Question number

(a)

Sol:

$$\Rightarrow 187 \div = 62 \text{ } 33$$

next prime is next $62 \rightarrow 61$ is prime

Finding prime before 61

$$\text{before } 61 = 59$$

$$\text{after } 61 = 67$$

Confirming

$$59 + 67 + 61 = 187$$

Answer 59, 61, 67

(b)

Let a number be $x > 0$

$$\text{Given: } x + 17 = \frac{60}{x}$$

$\times$ b.s by x

$$\Rightarrow x^2 + 17x = 60$$

Rearrange

$$x^2 + 17x - 60 = 0$$

Solve quadratic

$$\Delta = 17^2 - 4(1)(-60) = 289 + 240 = 529,$$

$$\sqrt{\Delta} = 23$$

$$x = \frac{-17 \pm 23}{2} \Rightarrow x = \frac{6}{2} = 3$$

$$\text{or } x = \frac{-40}{2} = -20$$

Since $x > 0$, $x = 3$

Answer = 3