

**Toppr**  
**Class - X**  
**Sample Question Paper - CBSE 2020**

**Time : 3 Hrs**

**M.M.:80**

**General Instructions:**

1. The question paper comprises three sections – A, B and C. Attempt all the sections.
2. All questions are compulsory.
3. Internal choice is given in each section.
4. All questions in **Section A** are **one-mark** questions comprising **MCQ, VSA type and assertion-reason type questions**. They are to be answered in one word or in one sentence.
5. All questions in **Section B** are **three-marks**, short-answer type questions. These are to be answered in about 50 – 60 words each.
6. All questions in **Section C** are **five-marks**, long-answer type questions. These are to be answered in about 80 – 90 words each.

**SECTION - A**

**1. Anomalous pair in Mendeleev's periodic table is:**

- A. Li, Na
- B. Mg, Al
- C. Co, Ni
- D. Be, B

**Answer : C**

**Solution :** Some elements with higher atomic weight were placed before low atomic weight elements in order to maintain similar chemical nature of elements and are called inverted pairs or anomalous pairs. Anomalous pairs of Mendeleev's periodic table are *Ar – K, Co – Ni, Te – I, Th – Pa*.

**2. The formula  $V = IR$  is applicable to :**

- A. Ohmic conductors only
- B. Non ohmic conductors only
- C. Both ohmic & Non ohmic conductors
- D. Neither ohmic nor non ohmic conductors

**Answer : A**

**Solution :**  $V = IR$  is applicable only to ohmic conductors.

**OR**

A non-metal X exists in two different forms Y and Z. Y is the hardest natural substance, whereas Z is a good conductor of electricity. Identify Y and Z.

**Solution :** Y, that is, the hardest naturally occurring substance in the world is diamond.

The substance Z, which is a good conductor of electricity is Graphite.

Both diamond and Graphite come from carbon, a non metal which lacks lustre, and also does not conduct electricity.

Carbon and diamond and graphite have different properties due to the crystal structures of each.

**3. Assertion :** The property of attracting magnetic substance is called magnetism.

**Reason :** magnetic poles never repel other pole.

- A. Both Assertion and Reason are correct and Reason is the correct explanation for Assertion
- B. Both Assertion and Reason are correct but Reason is not the correct explanation for Assertion
- C. Assertion is correct but Reason is incorrect
- D. Assertion is incorrect but Reason is correct

**Answer : C**

**Solution :** The property of attracting magnetic substances is called magnetism is true. But magnetic poles repels other pole if it is a like pole.

**4. pH** of an aqueous *NaCl* solution at  $50^{\circ}C$  should be:

- A. 7
- B.  $> 7$
- C.  $< 7$
- D. 0

**Answer : C**

**Solution :** Hydrolysis of salt of [SA SB] is not possible and solution is neutral in nature ( $pH = pOH = 7$ ).

So, pH of the solution should be neutral that is 7.

But since the temperature is more than  $25^{\circ}C$  so neutral pH will be less than 7 since  $K_w$  increase.

5. What of the following is the non-renewable source of energy?

- A. Coal
- B. Solar energy
- C. Plants
- D. Biomass

**Answer : A**

**Solution :** Coal is a fossil fuel which is found underground. Once burned, it turns into ashes and it can never be used again.

**OR**

6. Which of the following is not a property of a good source of energy?

- A. High abundance of the resource
- B. High efficiency of the fuel
- C. High cost
- D. Causes less pollution

**Answer : C**

**Solution :** Properties of good sources of energy:

- 1) It is easily accessible, cost efficient and long lasting.
- 2) Causes no pollution on burning.
- 3) Produce more energy per unit mass/volume.
- 4) It is renewable and easily available.

Hence, high cost is not a property of good sources of energy.

7. Why is a normal eye not able to see clearly the objects placed closer than 25 cm

**Solution :** This is because the ciliary muscles of eye are unable to contract beyond a certain limit. If the object is placed at a distance less than 25 cm from the eye. Then the object appears blurred this is because light rays coming from object meet beyond the retina.

8. Define evolution. Why are traits acquired during the lifetime of an individual not inherited?

**Solution :** Evolution means 'descent with modification'. It simply means that the present day complex organisms have originated from the earlier simpler

forms of life during the course of ages by the process of gradual change. During reproduction, variations arise either because of errors in DNA copying or as a result of sexual reproduction. Let us study an example to look at some consequences of arising of variations in an attempt to explain how evolution occurs.

9. When you enter a dim lighted room from sunlight at noon time. What is the change in size of pupil?
- A. In the sunlight pupil contracts and after entering a dim lighted room the size of pupil increases.
  - B. In dim light size of pupil decreases and in sunlight the pupil size increases
  - C. Both A and B can occur. It depends on the size of eye
  - D. No change in size of pupil

**Answer : A**

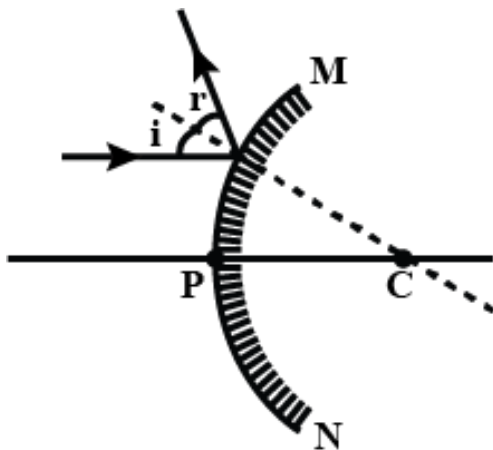
**Solution :** In sunlight the size of pupil decreases but in dim light the pupil gets enlarged and thus lets more light into the eye.

10. Draw a ray diagram to show the path of the reflected ray corresponding to an incident ray which is directed towards the principal focus of a convex mirror. Mark on it the angle of incidence and the angle of reflection.

**Solution :** In the above ray diagram,

$i$  = angle of incidence

$r$  = angle of reflection



11. In an experiment to trace the path of a ray of light through a glass prism for different values of angle of incidence a student would find that the emergent ray:

- A. is parallel to the incident ray
- B. perpendicular to the incident ray
- C. is parallel to the refracted ray
- D. bends at an angle to the direction of incident ray

**Answer : D**

**Solution :** The path followed by the incident ray and the emergent ray on passing through a prism are at different angles. Upon refraction of a ray of light through prism, the emergent ray always bends at an angle with incident ray called angle of deviation.

12. Can you explain the importance of catenation in carbon?

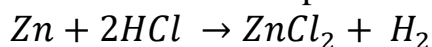
**Solution :** Catenation is the linkage of atoms of the same element into longer chains. Catenation occurs most readily in carbon, which forms covalent bonds with other carbon atoms to form longer chains and structures. This is the reason for the presence of the vast number of organic compounds in nature.

**OR**

What is the difference between displacement and double displacement reactions? Write equations for these reactions?

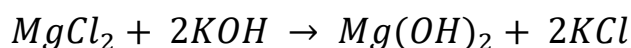
**Solution :** Displacement reaction:

Displacement reaction is a chemical reaction in which a more reactive element displaces a less reactive element from its compound.



Double displacement reaction:

A type of chemical reaction where two compounds react, and the positive ions (cation) and the negative ions (anion) of the two reactants switch places, forming two new compounds or products is called double displacement reactions.



**13. Assertion :** Carbon is non-metal.

**Reason :** Carbon atoms can bond with each other.

- E. Both Assertion and Reason are correct and Reason is the correct explanation for Assertion
- F. Both Assertion and Reason are correct but Reason is not the correct explanation for Assertion
- G. Assertion is correct but Reason is incorrect
- H. Both Assertion and Reason are incorrect

**Answer : B**

**Solution :** Carbon is a nonmetal according to its electronic configuration( 4 electrons in its valence shell). The self-linking property of carbon is called **catenation**.

Hence the correct option is B.

**14.** An object is placed at a distance of 15 cm from a convex lens of focal length 20 cm. List four characteristics (nature, position, etc.) of the image formed by the lens.

**Solution :** Given that  $u = -15\text{ cm}$   $f = 20\text{ cm}$

Now by lens formula

$$\frac{1}{f} + \frac{1}{v} + \frac{1}{u}$$
$$\frac{1}{v} = \frac{1}{10} - \frac{1}{20}$$
$$\Rightarrow v = 20\text{cm}$$

The image gets formed at 20 cm to the right of the lens and it will be inverted.

**15.** List the factors on which the resistance of a conductor in the shape of a wire depends.

**Solution :** Resistance of wire is given by  $R = \frac{\rho L}{A}$

Where L is the length of wire and A is the cross section of wire.

So resistance of wire depends directly on the length of wire and inversely on cross section of wire.

**16.** Name the scientist who first of all showed that atomic number of an element is a more fundamental property than its atomic mass.

**Solution :** In 1913, Henry Moseley showed that the atomic number of an element is a more fundamental [property than its atomic mass.

**17.** Write the function of the following part of human eye.

**Cornea.**

**Solution :** Light enters the eye through a thin membrane called the Cornea.

Cornea helps to shield the rest of the eye from germs, dust, and other harmful matter.

The cornea acts as the eye's outermost lens. It functions like a window that controls and focuses the entry of light into the eye. The cornea contributes between 65-75 percent of the eye's total focusing power.

For you to see clearly, light rays must be focused by the cornea and lens to fall precisely on the retina.

The cornea also serves as a filter, screening out some of the most damaging ultraviolet (UV) wavelengths in sunlight. Without this protection, the lens and the retina would be highly susceptible to injury from UV radiation

**18.** Write the function of the following part of human eye.

**Iris**

**Solution :** The iris is a thin, circular structure in the eye, responsible for controlling the diameter and size of the pupil and thus the amount of light reaching the retina. Eye color is defined by that of the iris.

**19.** Write the function of the following part of human eye.

**Crystalline lens**

**Solution :** The lens, by changing shape, functions to change the focal distance of the eye so that it can focus on objects at various distances, thus allowing a sharp real image of the object of interest to be formed on the retina.

**20.** What is meant by control and co-ordination?

**Solution :** Control is the power of restraining and regulation by which something can be started, slowed down or stopped. Co-ordination is the working together of various agents of the body of an organism in a proper manner to produce an appropriate reaction to a stimulus is called coordination. For example, the nervous system and endocrine system act in a coordinated manner for the proper regulation of body activities.

**OR**

Why is it necessary to conserve our environment?

**Solution :** The environment provides us fresh air to breathe, raw materials and useful products such as medicines, wood etc., for food and industrial purpose. It protects us from harmful UV radiations. It is necessary to conserve our environment because an increased interference of humans with the environment has proved to be detrimental to plants and animals.



## SECTION - B

**21.** What will happen to a compass needle when the compass is placed below a wire and a current is made to flow through the wire? Give a reason to justify your answer.

**Solution :** A convenient way of finding the direction of magnetic field associated with a current-carrying conductor is using the Right hand thumb rule.

Imagine that we are holding a current-carrying straight conductor in our right hand such that the thumb points towards the direction of current. Then our fingers will wrap around the conductor in the direction of the field lines of the magnetic field. This is known as the right-hand thumb rule.

Let us consider that a current through a horizontal power line flows in east to west direction. Applying the right-hand thumb rule, the direction of magnetic field at a point below the wire is from north to south. The direction of magnetic field at a point directly above the wire is from south to north.

Thus, when a magnetic compass is brought below the current carrying wire the compass needle show deflection in the north-south direction.

**22.** Compare human eye with a photographic camera

**Solution :**

- 1) The human eye and camera both have convex lens which form real and inverted image.
- 2) Eye's iris and the camera's aperture both passes the amount of light and both change depending on lighting conditions.
- 3) Both Eye and the camera focus on single objects and on large images and capture large scapes.
- 4) The cornea of the eye is very similar to the lens of a camera, both sit and the front of the body, are both transparent and have a spherical curvature.
- 5) Camera and eye both capable of viewing different tones of grey and various shades of other colours. and also capable of seeing near and far, judging the size of different things, registering depth and capturing movement.

**23.**What is meant by double circulation? What is its significance?

**Solution :** 1) Double circulation is a process during which blood passes twice through the heart during one complete cycle. This type of circulation is found in amphibians, reptiles, birds, and mammals. However, it is more prominent in birds and mammals as in them the heart is completely divided into four chambers – the right atrium, the right ventricle, the left atrium, and the left ventricle.

The movement of blood in an organism is divided into two parts:

- (i) Systemic circulation
  - (ii) Pulmonary circulation
- 2) Systemic circulation involves the movement of oxygenated blood from the left ventricle of the heart to the aorta. It is then carried by blood through a network of arteries, arterioles, and capillaries to the tissues. From the tissues, the deoxygenated blood is collected by the venules, veins, and vena cava, and is emptied into the left auricle.
- 3) Pulmonary circulation involves the movement of deoxygenated blood from the right ventricle to the pulmonary artery, which then carries blood to the lungs for oxygenation. From the lungs, the oxygenated blood is carried by the pulmonary veins into the left atrium.
- Hence, in double circulation, blood has to pass alternately through the lungs and the tissues.
- 4) Significance of double circulation:  
The separation of oxygenated and deoxygenated blood allows a more efficient supply of oxygen to the body cells. Blood is circulated to the body tissues through systemic circulation and to the lungs through the pulmonary circulation.

**OR**

What are tropic movements in plants? Why does the shoot of the plant bend towards light when it is kept in a cardboard box with a small hole on one of its side?

**Solution :** i)The tropic movements in plants can be defined as growth movement in response to a specific stimulus such as light, gravity, temperature, chemical substances, water, solid particles. The plants can show either positive (towards the stimulus) or negative (away from the stimulus) growth movement in response to the particular stimulus.

ii)The shoot of the plant bend towards the light when it is kept in a cardboard box with a small hole on one of its side, this happens due to phototropism.

iii)Phototropism is a phenomenon in which the growth of the plants takes place in response to the light stimulus. Usually, plant shoots and leaves

show positive phototropism whereas roots exhibit negative phototropism. Auxin plays an important role in phototropism. Depending on the direction of light stimulus plants begin redistribution of the auxin molecules to the farthest side from the light. As a result, the plant cells located distant from the sunlight contain greater auxin concentration show faster growth, which eventually causes the shoot to bend towards the light that enters through the hole of the cardboard box. This mechanism enables plants to revamp the amount of light they receive to enhance the rate of photosynthesis.

**24.** A milkman adds a very small amount of baking soda to fresh milk.

- (a) Why does he shift the pH of the fresh milk from 6 to slightly alkaline?
- (b) Why does this milk take a long time to set as curd?

**Solution :** a) When the milk is made more alkaline by adding a base to it, it is basically done to prevent it for more time to turning to curd. That's why milkman shifts the pH of fresh milk to slightly alkaline by adding a very small amount of baking soda to it as baking soda is alkaline in nature and it neutralizes the acidic nature of milk.

b) As this milk is slightly more alkaline than other, therefore, acid produced to set into curd will be neutralized by baking soda added by milkman. Hence, this milk takes a longer time to set as curd.

**25.** A spherical mirror produces an image of magnification -1 on a screen placed at a distance of 50 cm from the mirror.

- (a) Write the type of mirror.
- (b) Find the distance of the image from the object.
- (c) What is the focal length of the mirror ?
- (d) Draw the ray diagram to show the image formation in this case.

**Solution :** (a) As magnification is in positive the image will be upright compared to the object and will form a Concave Mirror.

(b) The distance of image from the object is zero, real and inverted image of the same size is formed at the same place where object is placed.

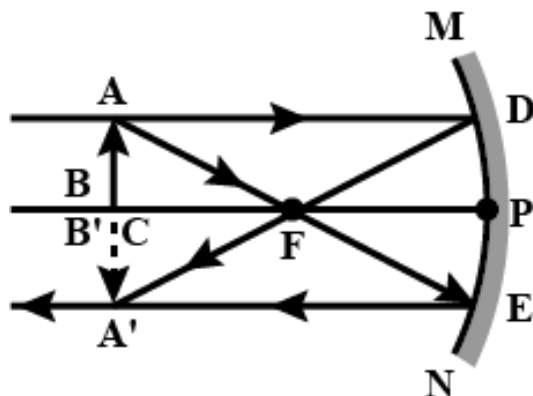
(c) Spherical mirror has a radius of curvature R and a focal length i.e

$$F = \frac{R}{2}$$

$$F = \frac{50}{2}$$

$$F = 25\text{cm}$$

d) Figure attached shows the image formation by concave mirror for the given case.



26. (a) List three common refractive defects of vision. Suggest the way of correcting these defects.

(b) About 45 lac people in the developing countries are suffering from corneal blindness. About 30 lac children below the age of 12 years suffering from this defect can be cured by replacing the defective cornea with the cornea of a donated eye. How and why can students of your age involve themselves to create awareness about this fact among people ?

**Solution :** (a) Three common refractive defects of vision are :

1. Myopia, also known as near-sightedness and short-sightedness, is a condition of the eye where the light that comes in does not directly focus on the retina but in front of it, causing the image that one sees when looking at a distant object to be out of focus.

2. Hypermetropia - A defect of the eye that causes light to focus behind the retina instead of directly on it, resulting in an inability to see near objects clearly

3. Presbyopia - is part of the natural aging process of the eye

1. Myopia is corrected by using a concave lens of appropriate power

2. Hypermetropia is corrected by using a convex lens of appropriate power.

3. Presbyopia cannot be cured. Instead, prescription glasses, contact lenses, reading glasses, progressive addition lenses, or bifocals can help correct the effects of presbyopia.

(b) Awareness can be spread by - Donating the eye to a needy after death, printing posters to aware people about it.

**OR**

What is atmospheric refraction? Use this phenomenon to explain twinkling of stars.

**Solution :** When light enters from one medium to another, it deviates from its path and this phenomenon is called refraction of light. Atmosphere is composed of layers of optical densities and due to the variation in air density there is the deviation of light or other electromagnetic wave from a straight line when it passes through the atmosphere known as Atmospheric refraction.

Due to atmospheric refraction of starlight the star twinkles. When the starlight enters the earth's atmosphere it undergoes refraction continuously before reaching to the earth. The atmospheric refraction occurs in a medium of gradually changing refractive index. As the atmosphere bends starlight towards the normal, so the apparent position of the star is slightly different from its actual position.

**27.** The relationship between the potential difference and the current in a conductor is stated in the form of a law.

(i) Name the law.

(ii) What does the slope of V-I graph for a conductor represent?

(iii) Name the material used for making the connecting wire.

**Solution :** (i) The relationship between the potential difference and the current in a conductor is known as Ohm's law. It is given by  $V = IR$ .

(ii) The slope of the V-I graph for a conductor represents the resistance of the conductor.

(iii) The material used for making the connecting wire is Copper since it has less resistance.

**28.** Why is conservation of energy sources essential in India? Give any three reasons.

**Solution :**

1. Energy is a basic requirement for economic development.

2. India is presently one of the least energy efficient countries in the world.

3. The economic development plans implemented since Independence necessarily required increasing amounts of energy to remain operational.

So there is an urgent need to develop a sustainable path of energy development. After all "energy saved is energy produced".

**OR**

What is atmosphere? Write about its different layers.

**Solution :** An atmosphere is a layer or a set of layers of gases surrounding a planet. An atmosphere is more likely to be retained if the gravity it is subject to is high and the temperature of the atmosphere is low.

The atmosphere can be divided into layers based on its temperature. These layers are the troposphere, the stratosphere, the mesosphere and the thermosphere. A further region, beginning about 500 km above the Earth's surface, is called the exosphere.

**29.** Calcium is an element with the atomic number 20.

- i) Will it be a metal or non-metal?
- ii) What will be its valency?
- iii) What would be the formula of its chloride?
- iv) Will it be smaller or larger than potassium?

**Solution :** The atomic no. of calcium is 20.

Electronic configuration = 2,8,8,2

The valence electrons in calcium are 2. Thus it is a metal of group 2.

The valency of calcium is +2 as it has 2 valence electrons.

The chloride of calcium is  $CaCl_2$  as the valency of chloride ion is -1 and that of calcium is +2.

It is smaller than K as both elements lie in the third period of the periodic table but K lies to the left of Ca in the period and we know that atomic size decreases as we move right in a period.

**30.** Show how would you join three resistors, each of resistance  $9\Omega$  so that the equivalent resistance of the combination is  $13.5\Omega$  ?

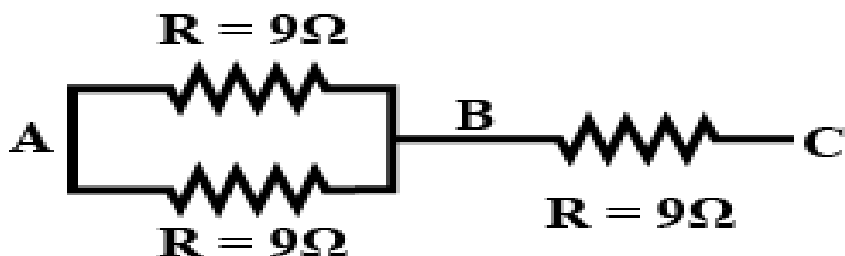
**Solution :** Resistance of each resistor  $R = 9\Omega$

Two resistors connected across A and B are connected in parallel.

Equivalent resistance across A and B  $R_{AB} = \frac{R \times R}{R + R} = \frac{R}{2} = \frac{9}{2} = 4.5\Omega$

This equivalent resistance is connected in series to another resistor R.

So equivalent resistance across A and C  $R_{AC} = R_{AB} + R = 4.5 + 9 = 13.5\Omega$



### SECTION - C

31. A) Define the terms 'isomers'.

B) Draw two possible isomers of the compounds with molecular formula  $C_3H_6O$  and write their names.

C) Give the electron dot structures of the above two compounds.

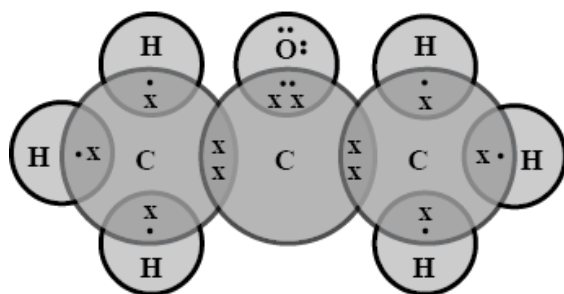
**Solution :** a. An isomer is a molecule with the same molecular formula as another molecule, but with a different chemical structure. That is, isomers contain the same number of atoms of each element but have different arrangements of their atoms.

b. Isomers with formula  $C_3H_6O$

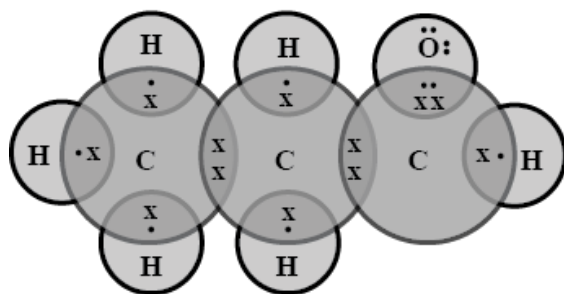
1. Propanal or propionaldehyde,  $CH_3CH_2 - CHO$ ,

2. Propanone or acetone  $CH_3 - CO - CH_3$

c.



Electron dot structure of propanone



Electron dot structure of propanal

**OR**

'Carbon forms backbone of biology of life on earth'. Justify.

**Solution :**

Carbon is considered the basis for all the chemicals necessary to sustain life. The reasons for saying that 'carbon forms the backbone of biology of life on Earth' are.

- i. Carbon is an element which forms many complex molecules (enzymes, proteins, nucleic acids) when bonded with other elements such as oxygen, hydrogen, nitrogen etc.
- ii. Carbon can bond with many carbon atoms through covalent bonding. This property of carbon results in the existence of various carbon allotropes such as diamond, graphite, grapheme and fullerenes.
- iii. It is only carbon which bonds strongly to the other carbon atoms. No other element can bond with such strong cohesion.
- iv. The strong cohesion bond between carbon atoms is responsible for almost all biochemical compounds necessary for life.
- v. Carbon is the major constituent in conventional sources of energy

**32.** (a) Write the functions of each of the following parts in a human female reproductive system:

- (i) Ovary
  - (ii) Uterus
  - (iii) Fallopian tube
- (b) Write the structure and functions of placenta in a human female.

**Solution :** (i) The function of the ovary is to produce the egg which develops in the Graafian follicle. The ovary is also responsible for the production of the hormones progesterone and estrogen.

(ii) The function of the uterus is to provide space for the growth of the embryo. The placenta is developed as the point of attachment between the embryo and the uterus for providing nutrients.

(iii) The function of the fallopian tube is to provide the site for fertilization. Fertilization takes place in the ampulla region in the fallopian tube.

(b) The placenta is the structure that develops from part of chorion that forms villi and the underlying uterine tissues with maternal capillaries. It is an organ of exchange that provides oxygen and nutrients to the fetus and removes waste



produced by the fetus. It also provides antibodies to provide protection to the fetus.

**OR**

What are the different methods of contraception?

**Solution :**

Any approach used to prevent the conception of unwanted pregnancy refers to contraception. Major contraceptive methods are categorized as barrier methods, surgical and chemical methods.

Barrier methods are the physical devices that prevent contraception by inhibiting the entry of sperms in the female genital tract. Example: condoms, diaphragms, cervical caps, etc.

Surgical methods include vasectomy (blocks vas deferens to prevent sperms from coming out) and tubectomy (blocks fallopian tubes to prevent the entry of eggs in it) in males and females respectively.

Chemical methods of contraception include any hormonal preparation that serves to alter the hormonal balance of the body to prevent egg maturation or fertilization. For example, oral and vaginal pills.

Other methods include intrauterine devices (inserted by a physician into the uterus to prevent implantation), medical termination of pregnancy, coitus interruptus, etc.

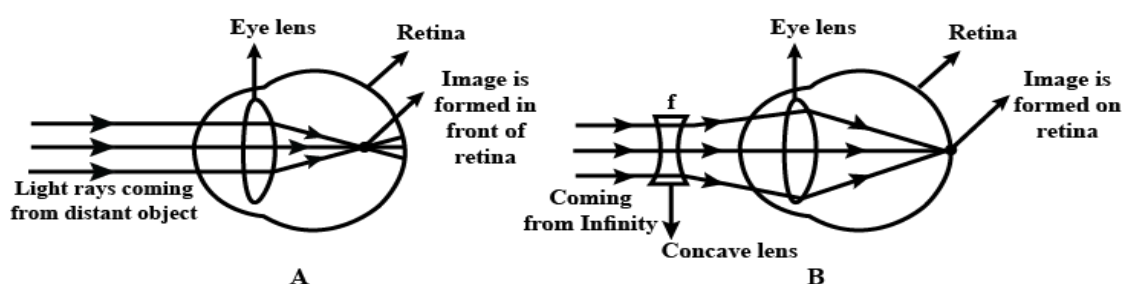
**33.** What is Myopia? Give its reasons. Explain with the help of a labelled ray diagram, how it is corrected?

**Solution :** Myopia is a defect of vision in which a person clearly sees all the nearby objects, but is unable to see the distinct object comfortably and his eye is known as myopia eye. A myopic eye has its far point near that infinity. It forms the image of a distinct object in front of the retina as shown in the figure A.

Myopia can be caused by

1. increase in curvature of the lens.
2. increase in the length of the eye ball.

Since concave lens has an ability to diverge incoming rays, it is used to correct this defect of vision. The image is allowed to form at the retina by using a concave lens of suitable power as shown in the figure B.



## OR

Analyse the following observation table showing variation of image distance ( $v$ ) with object distance ( $u$ ) in case of a convex lens and answer the questions that follow without doing any calculations:

S.No.	Object-Distance $u(\text{cm})$	Image-Distance $v(\text{cm})$
1.	-100	+25
2.	-60	+30
3.	-40	+40
4.	-30	+60
5.	-25	+100
6.	-15	+120

Select an appropriate scale and draw a ray diagram for the observation at S.No.

2. Also find the approximate value of magnification.

**Solution :** This is the diagram for the observation no 2.

We know that,

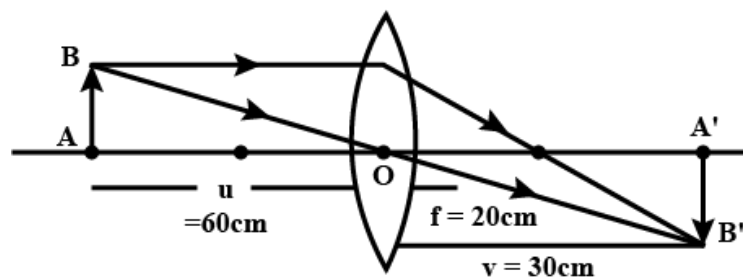
Magnification of the object

$$m = -\frac{v}{u},$$

$$\text{So } m = \frac{30}{-60}$$

$$m = -\frac{1}{2},$$

$$m = -0.5$$



**34.** What is a D.C. electric motor? Explain its construction and working.

**Solution :** It is a machine which converts electrical energy to mechanical energy. It is based on the principle of magnetic effect of current.

Construction: It essentially consist of the following parts:

(a) Field magnet (NS): In common dynamo it is a horse shoe magnet but for

strong field electromagnet is used.

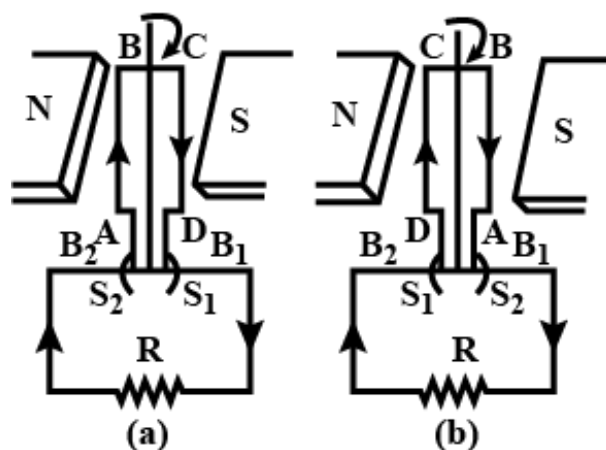
(b) Armature (ABCD): It consists of a coil of insulated copper wire, wound on a soft iron core. It is rotated between the pole pieces by some external device.

(c) Split ring commutator ( $S_1, S_2$ ): The commutator is just a copper ring split into two halves  $S_1$  and  $S_2$  insulated from each other and the shaft. The ends of the coil are connected to  $S_1$  and  $S_2$  respectively.

(d) Brushes ( $B_1, B_2$ ): These are carbon strips which slide against the split rings  $S_1$  and  $S_2$ . The current induced in the armature flows through these brushes in the external circuit.

Working: The armature ABCD is rotated in the clockwise direction in the field and at any instant,  $S_1$  is in contact with  $B_1$  and  $S_2$  with  $B_2$ . Under such a situation AB will come up the plane of paper and CD will go down. Then by Fleming's right hand rule, the direction of induced current will be along  $ABCDS_1B_1RB_2S_2A$ . So, the current in the external circuit flows from  $B_1$  to  $B_2$  through R.

After half rotation, split ring  $S_2$  is in contact with  $B_1$  and  $S_1$  and the arms AB and CD interchange their positions. Now again when the coil is rotated clockwise CD comes up the plane of paper and AB goes down. Then by Fleming's right hand rule the direction of induced current is  $DCBAS_2B_1RB_2S_1D$ . Hence, in the external circuit the current flows from  $B_1$  to  $B_2$  through R. So, the current in the external circuit flows in the same direction. Hence, direct current is obtained.



**D.C. electric motor**

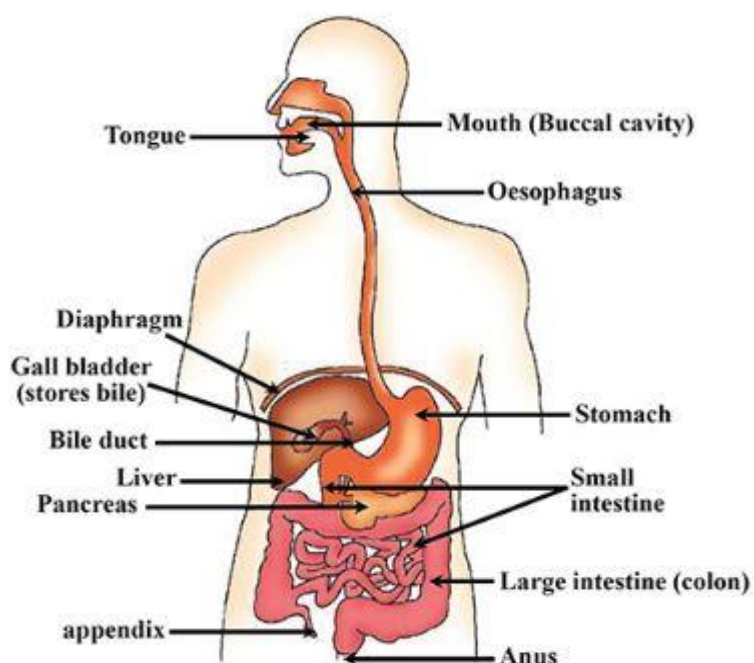
35. The modern periodic table has been evolved through the early attempts of Dobereiner, Newland and Mendeleev. List one advantage and one limitation of all the three attempts.

**Solution :**

Theories	Advantage	Limitation
Dobereiner's triad	It made chemist look at the elements as a group of elements having same physical and chemical properties	He could identify only three triads from the elements known at that time. Hence, it was not useful.
Newland's law of octaves	First attempt to classify elements on the basis of the concept of atomic masses	Law of octaves was applicable only up to calcium
Mendeleev's periodic table	Mendeleev's periodic table could predict errors in the atomic masses of certain elements.	It did not provide clear structure of atom

36. Draw a labelled diagram of human digestive system and explain it.

**Solution :**



(i). Food is crushed and cut in the mouth with the help of teeth and is mixed with saliva that is secreted by three salivary glands (one below the tongue and two at the side of the jaw) to make it wet and slippery, this process is known as mastication.

(ii) Saliva contains amylase that breaks down complex carbohydrates and the tongue helps in pushing the food to the next part of the alimentary canal.

(iii) The soft food then passes through the oesophagus in a wave-like movement known as a peristaltic movement.

(iv) In the stomach, food mixes with gastric juices and dil. HCl. The food is broken down to simple substances with the help of digestive enzymes like pepsinogen, while mucus protects the walls of the stomach.

(v) From the stomach, the food moves into the small intestines with the help of ring-like muscles called pyloric sphincters which allow only a little food to pass through at a time.

(vi) In the small intestine, the carbohydrates, proteins, and fats are broken down with the help of juices secreted by the pancreas, liver and the small intestine itself.

(vii) Fat is converted into small globule-like forms with the help of bile juices from the liver. This process is known as emulsification.

(viii) Pancreatic juices contain trypsin enzyme that breaks down proteins and lipase that breaks down fats.

(ix) The later part of the small intestines is alkaline in nature and helps in the digestion of carbohydrates.

(x) The broken-down food is then absorbed by small projections present on the inside walls of the intestine called villi. Villi are surrounded by blood and lymph vessels that absorb the food and transport it to the rest of the body.

(xi) Finally, the food moves into the large intestine where most of the water is removed from the food and is then passed out of the body through the anus.

**ALL THE BEST**