CBSE Class 10 Science

Sample Paper - 01

Maximum Marks: 80

Time Allowed: 3 hours

General Instructions:

i. The question paper comprises three sections – A, B and C. Attempt all the sections.
ii. All questions are compulsory.
iii. Internal choice is given in each section.
iv. 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.
v. All questions in Section B are three-mark, short-answer type questions. These are to be answered in about 50 - 60 words each.
vi. All questions in Section C are five-mark, long-answer type questions. These are to be answered in about 80 – 90 words each.
vii. This question paper consists of a total of 30 questions.

Section A

1. Translate the following into a chemical equation and balance it.
   Chlorine burns in hydrogen to give hydrogen chloride.
2. Out of the two elements X and Y which has bigger atomic radius?
   i. .X has atomic number =18 and atomic mass =40.
   ii. Y has atomic number =20 and atomic mass =40.
3. **Answer the questions that follows on the basis of your understanding of the following paragraph and the related studied concepts:** In order to produce hydel electricity, high-rise dams are constructed on the river to obstruct the flow of water and thereby collect water in larger reservoirs. The water level rises and in this process, the kinetic energy of flowing water gets transformed into potential energy. The water from the high level in the dam is carried through pipes, to the turbine, at

the bottom of the dam. Since the water in the reservoir would be refilled each time it rains (hydropower is a renewable source of energy) we would not have to worry about hydro-electricity sources getting used up the way fossil fuels would get finished one day.

i. What type of source of energy is mentioned in the above picture?
ii. How does electricity can be generated with a hydropower plant?
iii. Which form of energy of flowing of water gets transformed?
iv. Why dam is constructed across the river or a stream?

4. You must have noticed many dramatic changes in your appearance as well as that of your friends as you approached 10–12 years of age. These changes associated with puberty are because of the secretion of testosterone in males and oestrogen in females. Do you know anyone in your family or friends who has been advised by the doctor to take less sugar in their diet because they are suffering from diabetes? As a treatment, they might be taking injections of insulin. This is a hormone which is produced by the pancreas and helps in regulating blood sugar levels. If it is not secreted in proper amounts, the sugar level in the blood rises causing many harmful effects. Answer the following questions:
   a. Write the name of the hormone which is secreted by the pancreas.
   b. Name the hormone which is secreted by male and female during the adolescent.
   c. What happens if Insulin is not secreted in the proper amount?
   d. From which cells of pancreatic islets insulin and glucagon hormone are secreted?

5. Match the following with correct response.

   (1) Hypermetropia

   (2) Myopia

   (3) Presbyopia

   (4) Astigmatism

   (A) Cylindrical lens

   (B) Concave lens

   (C) Convex lens

   (D) Bifocal lens

   a. 1-C, 2-B, 3-D, 4-A
   b. 1-A, 2-C, 3-B, 4-D
   c. 1-D, 2-A, 3-C, 4-B
   d. 1-B, 2-D, 3-A, 4-C

OR

The refractive indices of three media P, Q, R, are 1.73, 1.33 and 2.24 respectively. Arrange these media in increasing order of their optical density.

   a. Q, P, R
   b. R, Q, P
   c. Q, R, P
   d. P, Q, R

6. Tawa irrigation project is in
   a. Madhya Pradesh
   b. Orissa
   c. Haryana
   d. Maharashtra
7. A current carrying conductor placed in magnetic field experiences a force. The displacement of the conductor in magnetic field can be increased by
   a. Decreasing the current in the conductor.
   b. Increasing the magnetic field.
   c. Increasing the current in the conductor.
   d. Decreasing the magnetic field.

8. 10 mL of a solution of NaOH is found to be completely neutralized by 8 mL of a given solution of HCl. If we take 20 mL of same solution of NaOH, the amount of HCl solution required to neutralize it will be
   a. 12 mL
   b. 16 mL
   c. 8 mL
   d. 4 mL

OR

The test tube I contains sodium bicarbonate solution while test tube II contains lemon juice on introducing pH paper in both of them, it is observed that the pH paper turns

   a. blue in I and red II
   b. blue in both
   c. red in I and blue in II
   d. red in I and pink in II

9. What percentage of sunlight is captured by plants to convert it into food energy?
   a. More than 50%
   b. 10%
   c. 1%
   d. 50%

10. Secondary treatment in sewage treatment plant involves**:**
   a. Chemical treatment
   b. Physical treatment like sedimentation
   c. Passing ultraviolet radiations
   d. Biological treatment

11. Which of the following statement is true?

    Statement A: Energy is always released when a neutral atom gains an electron

    Statement B: Tellurium and polonium are semi metals

    a. Statement B is true and A is false

    b. Neither statement A nor statement B is true

    c. Statement A is true and B is false

    d. Both the statement A and B are true

12. Match the following with the correct response**:**

(1) Electrolytic reduction	(A) Sodium
(2) Electrolytic refining	(B) Zinc
(3) Reduction with carbon	(C) Impure copper
(4) Reduction with aluminium	(D) Chromium

    a. 1-C, 2-B, 3-D, 4-A

    b. 1-A, 2-C, 3-B, 4-D

    c. 1-B, 2-D, 3-A, 4-C

    d. 1-D, 2-A, 3-C, 4-B

13. **Assertion:** C_8H_8 and C_4H_{10} are the successive members of the homologous series of methane.
    Reason: Any two successive members in a homologous series differ in their molecular formula by a $-CH_3$ unit.

    a. Assertion is INCORRECT but, reason is CORRECT.
    b. Both assertion and reason are CORRECT but, reason is NOT THE CORRECT explanation of the assertion.

c. Assertion is CORRECT but, reason is INCORRECT.
d. Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.

14. **Assertion:** Wire A is thin in comparison to wire B of same material same length then resistance of wire A is greater than resistance of wire B.
Reason: Resistivity of wire A is greater than resistance of wire B.

a. Assertion is INCORRECT but, reason is CORRECT.
b. Assertion is CORRECT but, reason is INCORRECT.
c. Both assertion and reason are CORRECT but, reason is NOT THE CORRECT explanation of the assertion.
d. Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.

Section B

15. What is the biological importance of pH?

16. List the characteristics of a chemical reaction.

OR

What is rancidity?

17. Why do group 1 elements form unipositive ions?

18. How many chambers of heart are present in fishes and amphibians?

OR

How is urine produced?

19. Why convex lens is called converging lens?

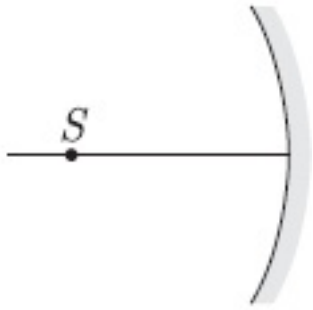
20. A change in DNA that is useful for one property to start with, can become useful later for a different function. Explain.

21. A close coordination exists between the nerves and hormones. Discuss.

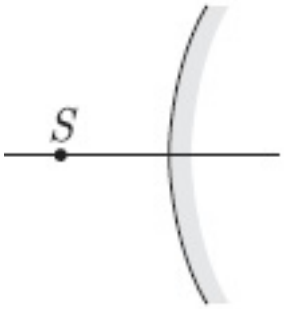
22. Explain, why electric power transmitted at high voltages and low currents to distant places?

23. Draw a schematic diagram of a circuit consisting of 3V battery, 5 Ω, 3 Ω and 1 Ω resistor, an ammeter and a plug key, all connected in series.

24. An optical component and an object S is placed along its optic axis. The distance between the object and the component can be vary.



i. What types of image can be formed in the above diagram?



ii. What type of images can be formed in the above diagram?

iii. Draw the ray diagram for the image formation by a concave mirror when the object is placed at the focus.

OR

How to distinguish between plane mirror, convex and concave mirror without touching?

Section C

25. i. How do you classify elements into metals and non-metals on the basis of their

electronic configuration? Choose metal and non-metal out of the following:
${}^{23}_{11}A, {}^{19}_{9}B, {}^{24}_{12}C, {}^{31}_{15}D, {}^{35}_{17}E$

ii. What type of bond will be formed if

a. 'A' combines with 'B'?

b. 'A' combines with 'E'?

c. 'C' combines with 'E'?

d. 'D' combines with 'E'?

26. Name the following compounds.

1. $H-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-OH$
2. $H-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{\overset{O}{||}}{C}-OH$
3. $H-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-Cl$
4. $H-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-OH$
5. $H-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-C\equiv CH$
6. $H-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{}{\underset{\underset{O}{||}}{C}}-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-H$

27. Describe the flow of blood through the heart of human beings.

28. Describe the various methods of birth control.

OR

What is the need of population control?

29. (a) Define electrical energy with the S.I. unit?

(b) A household uses the following electric appliance:
(i) Refrigerator of rating 400Wfor ten hours each day.
(ii) Two electric fans of rating 80W each for twelve hours each day.
(iii) Six electric tubes of rating 18W each for six hours each day.
Calculate the electricity bill of the household for the month of June if the cost per unit of electric energy is ₹3.00

30. How are the images formed in convex mirror when object is moved from infinity to the mirror?

OR

One half of a convex lens of focal length 10 cm is covered with a black paper. Can such a lens produce an image of a complete object placed at a distance of 30 cm from the lens? Draw a ray diagram to justify your answer.
A 4 cm tall object is placed perpendicular to principal axis of a convex lens of focal length 20 cm. The distance of the object from the lens is 15 cm. Find the nature, position and the size of the image.

CBSE Class 10 Science

Sample Paper 04 (2019-20)

Answer

Section A

1. Chlorine burns in hydrogen to give hydrogen chloride.
   Chlorine + hydrogen $\rightarrow$ hydrogen chloride.
   $Cl_2 + H_2 \rightarrow 2HCl$

2. Radius of Y is bigger than that of X. This is because in X, the number of shells are three which are K, L, M (2, 8, 8) while in Y, the number of shells are 4 which are K, L, M, N (2, 8, 8, 2) . As number of shells increases radius of atom also increases.

3. i. It is a renewable source of energy.
   ii. Hydropower plants capture the energy of falling water to generate electricity. A turbine converts the kinetic energy of falling water into mechanical energy. Then a generator converts the mechanical energy from the turbine into electrical energy.
   iii. The kinetic energy of flowing water gets transformed into potential energy.
   iv. A Dam is built to control water through placement of a blockage of earth, rock across a stream or river. They usually store water in the reservoir, which is then used for a variety of applications such as irrigation and municipal water supplies.
4. a. Insulin hormone is secreted by the pancreas.
   b. Testosterone in male and oestrogen in the female are the hormone that is secreted during the adolescent.
   c. If Insulin is not secreted in the proper amount then it causes diabetes.
   d. Glucagon and Insulin are secreted from alpha and beta cells of islets of pancreas respectively.
5. (a) 1-C, 2-B, 3-D, 4-A, **Explanation:** For correction of **hypermetropic eye** or long-sighted eye, a convex lens is used.
   For correction of **myopic eye** or short-sighted eye, a concave lens is used.
   For correction of **presbyopia**, a bifocal lens (upper position consisting of concave lens and lower portion consisting of convex lens) is used.

Astigmatism can be corrected by using cylindrical lenses.

OR

(a) Q, P, R, **Explanation:** The refractive index is a measurement of optical density. A medium with a low optical density, would have also a low refractive index.

6. (a) Madhya Pradesh, **Explanation:** Tawa project is located at 50 km from Itarsi in Hoshangabad district of Madhya Pradesh. It is constructed on Tawa river, a left bank tributary of Narmada.
7. (b) Increasing the magnetic field.
   Explanation: Strength of magnetic field is directly proportional to current. Strength of magnetic field is inversely proportional to radius of circular wire. The amount of force experienced by a current-carrying conductor placed in a magnetic field depends on the direction of the current with respect to the magnetic field and its displacement can be increased by increasing the magnetic field.
8. (b) 16 mL, **Explanation:** 10 L of NaOH neutralises 8mL of HCl
   i.e. 1 mL of NaOH neutralises $\frac{8}{10}$ mL of HCl
   so, 20 mL of NaOH will neutralise $\frac{8}{10} \times 20$ = **16mL of HCl**

OR

(a) blue in I and red II, **Explanation:** pH paper will turn blue in $NaHCO_3$ (sodium bicarbonate) solution whereas it will become red in lemon juice because $NaHCO_3$ solution is basic.

9. (c) 1%, **Explanation:** 1%
10. (d) Biological treatment, **Explanation:** Secondary treatment in sewage treatment plant involves biological treatment (use of microorganisms)
11. (a) Statement B is true and A is false, **Explanation:** Statement A: Sometimes, energy is to be supplied to the atom while adding electron to it.
    Statement B: Since, both Tellerium and Polonium shows properties of both metals and non-metals, therefore, they are semi-metals.
12. (b) 1-A, 2-C, 3-B, 4-D, **Explanation:** Highly reactive metals like **sodium**, which cannot be obtained be extracted by reducing their oxides with carbon, are obtained by electrolysis of their chlorides (**electrolytic reduction**) in molten state. **Electrolytic refining** is used for

refining impure copper. **Zinc oxide** can be reduced with **carbon** (or coke). **Chromium** can be obtained from its oxide ore by **reduction** with **aluminium powder**.

13. (c) Assertion is CORRECT but, reason is INCORRECT. Explanation: Assertion is CORRECT but, reason is INCORRECT.
14. (b) Assertion is CORRECT but, reason is INCORRECT. Explanation: Assertion is CORRECT but, reason is INCORRECT.

Section B

15. 1. Our body works within the pH range of 7.0 to 7.8
    2. Living organisms can supplies in a narrow pH range.
    3. When the pH of rain water becomes less than 5.6, it is called acid rain. When the water flows into the rivers, the survival of aquatic life becomes difficult due to increase in pH.

16. The presence of any of the following changes helps us to determine that a chemical reaction has taken place :
    (i) Formation of new substance(s)
    (ii) Change in state
    (iii) Change in colour
    (iv)Change in temperature
    (v) Formation of a precipitate
    (vi) Evolution of a gas
    For example, if on mixing two substances,a gas is evolved, then we can say that a chemical reaction has taken place.

OR

Rancidity: It is a process of oxidation in which fats and oils present in food items are oxidised that can be easily noticed by the change in their taste and smell.

Rancidity can be prevented by:

1. Storing food in refrigerators or in air-tight containers.

2. Flushing oil and fat containing food items with nitrogen before their packing.

3. By adding anti-oxidant

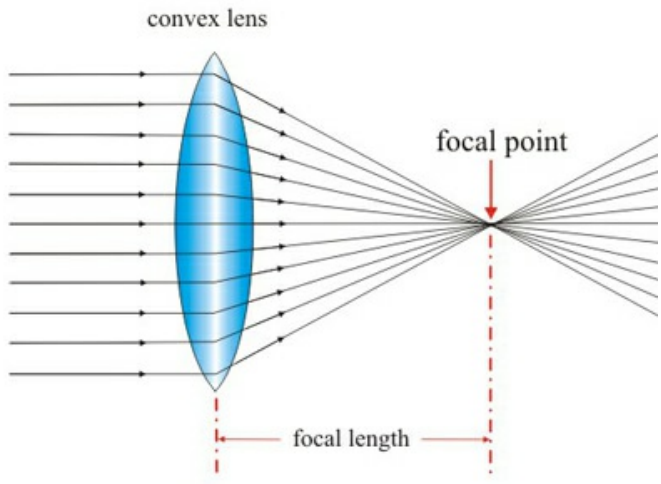
17. Group 1 elements contain 1 electron in their outermost shells. These elements lose this electron easily to attain the 8 electrons configuration in their outermost shell, to attain stable configuration. Hence, they form unipositive ion.

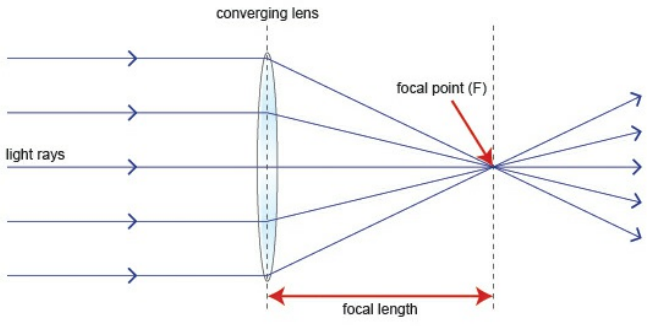
18. **Two chambers**: one atrium and one ventricle (fish)
Three chambers: two atria and one ventricle (amphibian and reptile)

OR

The blood enters the glomerulus of the nephron (it is the nertwork of capillaries present in Bowman's capsule) through renal artery where it is filtered. From there, it passes through the tubular part, where glucose, amino acid, salts and a major amount of water are selectively reabsorbed. The filtrate collected afterwards in kidney is called urine. Which passes through ureter to urinary bladder.

19. A convex lens is called a converging lens because it makes parallel light rays passing through it bend inward and meet (converge) at a spot just beyond the lens known as the **focal point** (principal point). Convex lenses are thicker at the middle. Rays of light that pass through the lens are brought closer together that they converge.



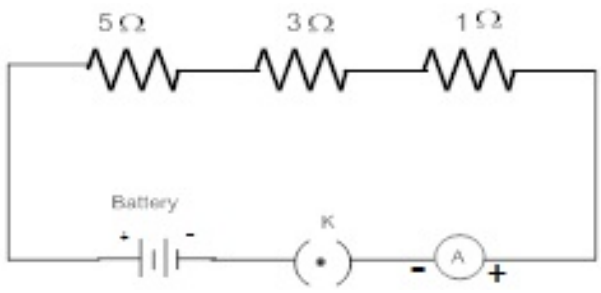


20. A change/feature/property of an organism that may have helped it to adapt to an environmental condition can also become useful for a completely different function in the future. For example: feathers in birds, a character developed and selected during natural selection because it provided insulation in cold weather have become useful in later stages for flight.
    Some dinosaurs had feathers, but they could not fly. Birds later adapted the feathers to flight.

21. In human beings, the control and coordination is brought about by both nervous system and endocrine system. The nervous system works by the generation and transmission of electrical impulse while the endocrine system works by secreting chemical messengers called hormones. These systems complement the action of each other to control and coordinate different functions of our body. The endocrine and neural system works in tandem for the normal functioning of our body.
    E.g. The presence of food in our stomach, distends the gastric wall. This results in secretion of gastric hormone which stimulates gastric juice secretion in the stomach. Likewise, an increase in the concentration of adrenaline stimulates the respiratory centre of the brain. This, in turn increases the breathing rate of an individual.

22. As the current flowing through the wire will cause resistance, higher the current higher is the resistance then heat produced will be large and it will damage the cable or wire. So, the lower current is transmitted to avoid the damage to cable by heat, and it will also reduce the cost of transmission as the lower value of current will require less cross-sectional area and to keep the power same, the voltage has to be high which can be understood by the relation:

    Power = Voltage * Current

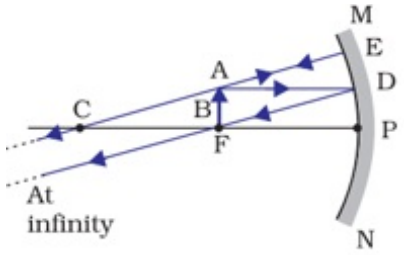
23. 

24. i. Real image, virtual image, magnified image, and image at infinity can be formed

in the above diagram.

ii. Only virtual image can be formed in the above diagram.

iii. The ray diagram for the image formation by a concave mirror when the object is placed at the focus is as follows:



OR

Look through all these mirror turn by turn. In the plane mirror, we shall observe that the image is erect, of the same size as the object and as far behind the mirror as the object is in front of it. If the image is always diminished and erect then the mirror must be convex mirror. If the image will appear erect and very large when seen by placing face near the mirror. However when face is placed at a distance, image will be always inverted. This mirror is concave.

Section C

25. i. Elements which contain 1 to 3 electrons in their outermost shell are metals. Elements containing 4 to 7 electrons in their valence shell are non-metals.
Electronic configurations:
$^{23}_{11}Na(Z = 11) = 2, 8, 1$
$^{19}_{9}B(Z = 9) = 2, 7$
$^{24}_{12}C(Z = 12) = 2, 8, 2$
$^{31}_{15}D(Z = 15) = 2, 8, 5$
$^{35}_{17}E(Z = 17) = 2, 8, 7$
Hence A and C are metals whereas, B, D and E are non-metals.

ii. Type of bonds

a. 'A' is metal and 'B' is non-metal, so the bond formed will be ionic.

A =2, 8,1 B = 2, 7

Ionic bond

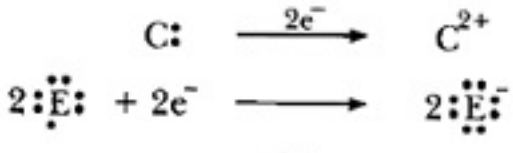
b. 'A' is metal and 'E is non-metal, so the bond formed is ionic.

A = 2, 8, 1 B = 2, 7

Ionic bond

c. 'C' is metal and 'E' is non-metal, so the bond formed is ionic.

C = 2, 8, 2 E = 2, 8, 7

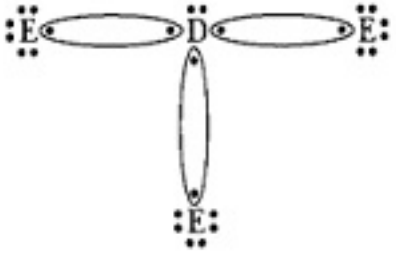


$C^{2+}2E^-$

Ionic bond

d. 'D' is a non-metal and 'E' is also a non-metal, so the bond formed will be covalent.

D = 2, 8, 5 E = 2, 8, 7



DE_3

Covalent bond

26. According to the question, Given compounds are

i. $H-\overset{H}{\underset{H}{C}}-\overset{H}{\underset{H}{C}}-\overset{H}{\underset{H}{C}}-OH$

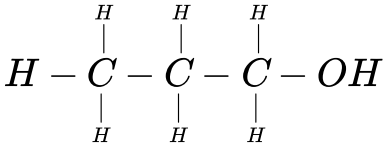
Propan-1-ol or Propanol

ii. $H-\overset{H}{\underset{H}{C}}-\overset{H}{\underset{H}{C}}-\overset{O}{\overset{\|}{C}}-OH$

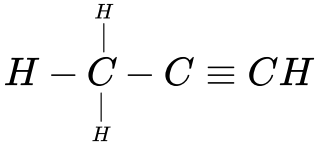
Propanoic acid

iii. $H-\overset{H}{\underset{H}{C}}-\overset{H}{\underset{H}{C}}-\overset{H}{\underset{H}{C}}-Cl$

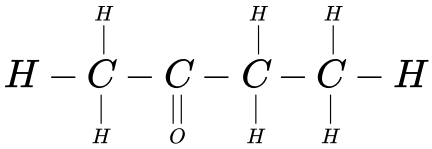
Chloropropane

iv. 

Propanal

v. 

Prop-1-yne or Propyne

vi. 

Butan-2-one

27. The heart is the major organ of our body which continuously pumps oxygen and nutrient-rich blood throughout our body to sustain life. As the heart beats, it pumps blood through a system of blood vessels, called the circulatory system.

    The blood enters the heart through two large veins, the inferior and superior vena cava, emptying oxygen-poor blood from the body into the right atrium. As the atrium contracts, blood flows from your right atrium into your right ventricle through the open tricuspid valve. When the ventricle is full, the tricuspid valve shuts. This prevents blood from flowing backward into the right atrium while the ventricle contracts. As the ventricle contracts, blood leaves the heart through the pulmonic valve, into the pulmonary artery and to the lungs, where it is oxygenated. The oxygenated blood then returns to the heart through the pulmonary veins. And finally, the oxygenated blood from the left ventricle is pumped through the aorta to the whole body.

28. **The various methods of birth control are:**
    1) Physical barriers - Use of contraceptives. It means prevention of conception: Following contraceptives are popular:
    a) Diaphragm: The vaginal diaphragm is a rubber cup stretches over a collapsible metal spring coil. It is designed to fit over the cervix, i.e. the mouth of uterus which prevents fertility or conception.
    b) Condom: The condom is a sheath of rubber which fits on the erect penis. It is put

on the penis before it is introduced in the vagina during intercourse.

c) Jellies, creams and foams: A number of different spermicidal jellies, creams and foams are available for use as contraceptive agents. These jellies, creams and foams are inserted into vagina five to fifteen minutes before ejaculation to take place.

d) Introduction of copper 'T' or loop in female uterus prevents the entry of sperms in uterus.

2) Chemical Methods: Oral contraceptives. These are popularly known as "pills" and are combinations of synthetic sex hormones which suppress the production of ovum. These pills alter the ovulation cycle. 'Mala' and Saheli' are the two common pills.

3) Surgical methods: Sterilization. It is surgical technique by which the passage of sperms or ovum is discontinued. Both men and women can be sterilized without losing their ability to function sexually.

a) Vasectomy: In men the sterilization procedure is called vasectomy.

b) Tubectomy: In woman part of fallopian tube is cut and tied off.

4) Medical termination of pregnancy (MTP): It is the cessation of pregnancy by surgery, suction or by other means.

5) Other measures.

a) Abstinence: Abstaining from intercourse.

b) Coitus interruptus: It involves the withdrawal of penis from the vagina before ejaculation occurs.

c) Zero '0' method: It is natural effective and practical method where the woman has to find out herself the fertile and infertile period, by keeping a close watch on uterine discharge. The safest period to avoid pregnancy is from the beginning of mucus discharge to next four days, after the discharge has stopped.

OR

Overpopulation leads to a number of problems like-

a) Unemployment- More number of people means more jobs and if sufficient numbers of jobs are not available, it leads to unemployment.

b) Poverty- If there are more persons and the income is less, it becomes poorer with the addition of every child.

c) Food supply- If the population increases and the food production does not increase; this will lead to shortage of food supply.

d) Hygienic condition- more people in small area generally make the condition unhygienic for survival

e) Educational problem- It becomes difficult for the government to provide education to all

f) Housing problem- It also creates housing problem.

g) Pollution- More pollution with increasing population.

h) Decrease in natural resources- More people will decrease the natural resources quickly.

29. (a) The work done by a source of electricity to maintain current in a circuit is known as electrical energy. Its S.I. unit is joule.

(b) (i) Electricity consumed by refrigerator in one day

= power $\times$ time

= 400W $\times$ 10h

= 4000Wh

= 4kWh

(ii) Electricity consumed by 2 electric fans in 1 day

= power $\times$ time

= 2 $\times$ 80W $\times$ 12h

= 1920Wh

= 1.92kWh

(iii) Electricity consumed by 6 electric tubes in 1 day

= 6 $\times$ 18W $\times$ 6h

= 648wh = 0.648 kWh

Total energy consumed in one day

= 4+1.92+0.648 = 6.548 kWh

Total energy consumed in one month

= 6.568 $\times$ 30

= 197.04 kWh

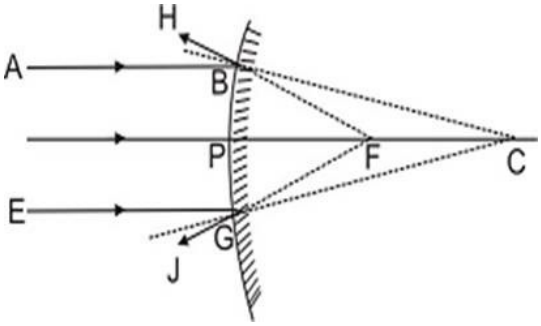
Cost of 1 unit (kWh) $=$ ₹3.00

$\therefore$Cost of 197.04 kWh = 197.04 $\times$3

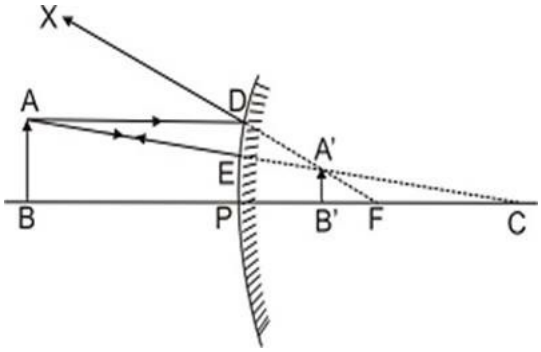
$\therefore$ The required electricity bill $=$ ₹591.12

30. Object at Infinity: Rays from infinity come parallel to principal axis. Ray AB is

reflected towards BH and ray EG is reflected towards GJ. When produced back they meet at F, the principal focus (Rule 1).
An extremely small, erect, virtual image is formed at F.



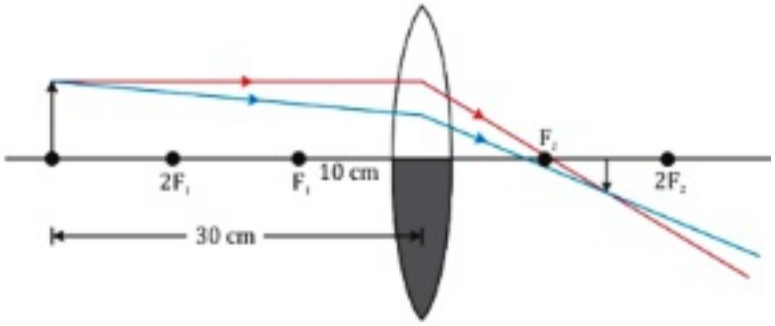
Object at infinity: A virtual, erect, extremely diminished image is formed at F.
Object placed anywhere except infinity. A ray AD parallel to principal axis after reflection appears to pass through F. Another ray AE normal to mirror and appearing to pass through C is reflected back along the same path. They appear to meet at A' forming image of A and A'. Similarly, image of B is formed at B'. This virtual, erect image of AB is formed at A'B' between P and F behind the mirror. Image is erect and diminished in size.



Object any where, A virtual, erect, diminished image is formed behind the mirror between F and P

OR

When a convex lens is covered half with black paper as shown in diagram, then image of full object will formed , but it will be of less intensity and brightness.



As h_0 = 4 cm, f = 20 cm and u = - 15 cm

By lens formula,

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

$$\Rightarrow \frac{1}{v} = \frac{1}{f} + \frac{1}{u} = \frac{1}{20} + \frac{1}{(-15)} = \frac{15-20}{300} = \frac{-5}{300}$$

$$\therefore \quad v = -60cm$$

As, magnification,

m = $\frac{h_i}{h_0} = \frac{v}{u}$

$$\Rightarrow h_i = h_0 \times \frac{v}{u} = 4 \times \frac{-60}{-15} = 16\ cm$$

Image formed is virtual, erect and magnified.