SET-1

Series JBB/4

Code No. 31/4/1

Roll No. | | | | | | | |

Note :

(I) Please check that this question paper contains **25** printed pages.

(II) Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.

(III) Please check that this question paper contains **30** questions.

(IV) Please write down the Serial Number of the questions before attempting it.

(V) 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

SCIENCE
HINTS & SOLUTIONS

Time allowed : 3 hours **Maximum Marks : 80**

General Instructions :

Read the following instructions very carefully and strictly follow them.

(i) This question paper comprises **three** Sections — **A, B** and **C.** There are 30 questions in the question paper. All questions are compulsory.

(ii) **Section A —** Questions no. **1** to **14** — all questions or part thereof are of one mark each. These questions comprise Multiple Choice Questions (MCQ), Very Short Answer (VSA) and Assertion-Reason type questions. Answer to these questions should be given in **one word** or **one sentence**.

(iii) **Section B —** Questions no. **15** to **24** are short answer type questions, carrying **3** marks each. Answer to these questions should not exceed **50** to **60** words.

(iv) **Section C —** Questions no**. 25** to **30** are long answer type questions, carrying **5** marks each. Answer to these questions should not exceed **80** to **90** words.

(v) Answers should be brief and to the point. Also the above mentioned word limit be adhered to as far as possible.

(vi) There is no overall choice in the question paper. However, an internal choice has been provided in some questions in each section. **Only one of the choices** in such questions have to be attempted.

(vii) In addition to this, separate instructions are given with each section and question, wherever necessary.

SECTION-A

1. Write the number of valence electrons present in a nitrogen atom $\left({}^{14}_{7}N\right)$. 1

Sol. 5

2. Define the term induced electric current. 1

Sol. Induced electric current : Current produce in a conductor due to change in magnetic flux through the coil is called induced current.

3. Answer question numbers 3(a) — 3(d) on the basis of you" understanding of the following paragraph and the related studied concepts :

Around the year 1800, only 30 elements were known. Dobereiner in 1817 and Newlands in 1866 tried to arrange the then known elements and framed laws which were rejected by the scientists. Even after the rejection of the proposed laws, many scientists continued to search for a pattern that correlated the properties of elements with their atomic masses.

The main credit for classifying elements goes to Mendeleev for his most important contribution to the early development of a Periodic table of elements wherein he arranged the elements on the basis of their fundamental property, the atomic mass and also on the similarity of chemical properties. The formulae of their hydrides and oxides were treated as basic criteria for the classification of the elements.
However, Mendeleev's classification also had some limitations as it could not assign the position to isotopes. He also left some gaps in the periodic table.

3(a) State Mendeleev's Periodic Law. 1

Sol. Mendeleev's periodic law states that "The properties of element are the periodic function of their atomic masses".

3(b) Why did Mendeleev leave some gaps in the Periodic table ? 1

Sol. Mendeleev left some gaps in the periodic table because he predicted the existence of some element that had not been discovered at that time.

3(c) If the letter `R' was used to represent any of the elements in the group, then the hydride and oxide of carbon would respectively be represented as 1

(i) RH_4, RO
(ii) RH_4, RO_2
(iii) RH_2, RO_2
(iv) RH_2, RO

Sol. **(ii)** RH_4, RO_2

3(d) Isotopes are 1

(i) Atoms of an element viith similar chemical properties but different atomic masses.
(ii) Atoms of different elements with similar chemical properties but different atomic masses.
(iii) Atoms of an element with different chemical properties but same atomic masses.
(iv) Atoms of different elements with different, chemical properties but same atomic masses.

Sol. (i) Atoms of an element with similar chemical properties but different atomic masses.

4. **Answer question numbers 4(a) - 4(d) on the basis of your understanding of the following paragraph and the related studied concepts :**

India today is facing the problem of overuse of resources, contamination of water and soil and lack of methods of processing the waste. The time has come for the world to say goodbye to "single-use plastics". Steps must be undertaken to develop environment-friendly substitutes, effective plastic waste collection and methods of its disposal.
Indore treated 15 lakh metric tonnes of waste in just 3 years, through biomining and bioremediation techniques. Bioremediation involves introducing microbes into a landfill to naturally `break' it down and biomining involves using trommel machines to sift through the waste to separate the `soil' and the waste component. The city managed to chip away 15 lakh metric tonnes of waste at a cost of around ₹ 10 crore. A similar experiment was successfully carried out in Ahmedabad also.

4(a) State two methods of effective plastic waste collection in your school. 1

Sol. Separating, reducing reusing, recycling and composting are good options for managing school waste.
(i) By creating awareness in students about the importance of plastic waste collection.
(ii) Effective plastic waste collection could be done by placing dustbins in each and every class of our school.

4(b) Name any two uses of "single use plastic" in daily life. 1

Sol. Two "single-use plastic" in daily life are plastic drinking bottles or plastic bottle caps, food wrappers.

4(c) If we discontinue the use of plastic, how environment-friendly substitute be provided ? 1

Sol. Stainless steel, glasses, platinum silicone, natural fiber cloth, wood, bamboo, paper, cardboard etc. could be used as an alternative to plastics.

4(d) Do you think microbes will work similarly in landfill sites as they work in the laboratory ? Justify your answer. 1

Sol. Microbes will work differently as both the conditions vary.

5. Which one of the following statements is correct about the human circulatory system ? 1
(A) Blood transports only oxygen and not carbon dioxide.
(B) Human heart has five chambers.
(C) Valves ensure that the blood does not flow backwards.
(D) Both oxygen-rich and oxygen-deficient blood gets mixed in the heart.

Sol. (C) Valves ensure that the blood does not flow backwards.

6. Anaerobic process 1
(A) takes place in yeast during fermentation.
(B) takes place in the presence of oxygen.
(C) produces only energy in the muscles of human beings.
(D) produces ethanol, oxygen and energy.

Sol. (A) takes place in yeast during fermentation.

OR

Most of the digestion and absorption of the food takes place in the 1
(A) small intestine.
(B) liver.
(C) stomach.
(D) large intestine.

Sol. (A) small intestine.

7. Fertilisation is the process of 1
(A) transfer of male gamete to female gamete.
(B) fusion of nuclei of male and female gamete.
(C) adhesion of male and female reproductive organs.
(D) the formation of gametes by a reproductive organ.

Sol. (B) fusion of nuclei of male and female gamete.

8. If a person has five resistors each of value $\frac{1}{5}\ \Omega$, then the maximum resistance he can obtain by connecting them is 1

(A) 1 Ω (B) 5 Ω (C) 10 Ω (D) 25 Ω

Sol. (D) 25 Ω

OR

The resistance of a resistor is reduced to half of its initial value. In doing so, if other parameters of the circuit remain unchanged, the heating effects in the resistor will become

(A) two times. (B) half. (C) one-fourth. (D) four times.

Sol. (A) two times.

9. Fleming's Right-hand rule gives 1
(A) magnitude of the induced current.
(B) magnitude of the magnetic field.
(C) direction of the induced current.
(D) both, direction and magnitude of the induced current.
Sol. (C) direction of the induced current.

10. Which one of the following statements is not true about nuclear energy generation in a nuclear reactor ?
(A) Energy is obtained by a process called nuclear fission. 1
(B) The nucleus of Uranium is bombarded with high energy neutrons.
(C) A chain reaction is set in the process.
(D) In this process a tremendous amount of energy is released at a controlled rate.
Sol. (B) The nucleus of Uranium is bombarded with high energy neutrons.

OR

The biggest source of energy on Earth's surface is 1
(A) Biomass (B) Solar radiations (C) Tides (D) Winds
Sol. (B) Solar radiations

11. Food web is constituted by 1
(A) relationship between the organisms and the environment.
(B) relationship between plants and animals.
(C) various interlinked food chains in an ecosystem.
(D) relationship between animals and environment.
Sol. (C) various interlinked food chains in an ecosystem.

12. Choose the **incorrect** statement from the following : 1
(A) Ozone is a molecule formed by three atoms of oxygen.
(B) Ozone shields the surface of the Earth from ultraviolet radiations.
(C) Ozone is deadly poisonous.
(D) Ozone gets decomposed by UV radiations.
Sol. (D) Ozone gets decomposed by UV radiations.

For question numbers 13 and 14, two statements are given – one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below :
(a) Both (A) and (R) are true and (R) is the correct explanation of the assertion (A).
(b) Both (A) and (R) are true, but (R) is not the correct explanation of the assertion (A).
(c) (A) is true, but (R) is false.
(d) (A) is false, but (R) is true.

13. Assertion (A) : Following is a balanced chemical equation for the action of steam on iron :
$$3Fe + 4H_2O \rightarrow 4\ Fe_3O_4 + 4H_2$$
Reason (R) : The law of conservation of mass holds good for a chemical equation. 1
Sol. (d) (A) is false, but (R) is true.

14. Assertion (A) : The sex of a child in human beings will be determined by the type of chromosome he/she inherits from the father.
Reason (R) : A child who inherits X' chromosome from his father would be a girl (XX), while a child who inherits a `Y' chromosome from the father would be a boy (XY). 1
Sol. (a) Both (A) and (R) are true and (R) is the correct explanation of the assertion (A).

SECTION-B

15. Lead nitrate solution is added to a test tube containing potassium iodide solution.
(a) Write the name and colour of the compound precipitated.
(b) Write the balanced chemical equation for the reaction involved.
(c) Name the type of this reaction justifying your answer. 3
Sol. (a) Lead iodide (PbI_2), and it is bright yellow precipitate.
(b) $Pb(NO_3)_2 + 2KI \rightarrow PbI_2 + 2KNO_3$
(c) It is double decomposition reaction.

OR

What happens when food materials containing fats and oils are left for a long time ? List two observable changes and suggest three ways by which this phenomenon can be prevented. 3

Sol. When food material containing fats and oil are left for a long time they become rancid i.e. oxidation of food material takes place.
Two observable changes are
(i) They start giving unpleasant smell.
(ii) Their taste changes.
Three ways by which rancidity can be prevented are
(i) Rancidity can be prevented by adding anti-oxidants to foods containing fats and oils.
Ex. : BHA (Butylated Hydroxy-Anisole) and BHT (Butylated Hydroxy Toluene).
(ii) Rancidity can be prevented by packaging fat and oil containing foods in nitrogen gas.
(iii) Rancidity can be retarded by keeping food in a refrigerator

16. List three differentiating features between the processes of galvanization and alloying. 3

Sol.

Galvanisation	**Alloying**
(i) The process of covering iron with zinc to prevent it from rusting is called galvanization. (ii) It does not modify the property of metal (iii) If the coating of zinc is removed then rusting take place.	(i) In this Fe is mixed with Ni & Cr which makes it hard and prevent iron from rusting. (ii) It modify property of metal (iii) Alloy will not rust

OR

Compare in tabular form the reactivities of the following metals with cold and hot water :
(a) Sodium
(b) Calcium
(c) Magnesium 3

Sol.

Sodium	Calcium	Magnesium
$2Na + 2H_2O \rightarrow 2NaOH + H_2$	$Ca + 2H_2O \rightarrow Ca(OH)_2 + H_2$	$Mg + 2H_2O \rightarrow Mg(OH)_2 + H_2$
The reaction is so violent and exothermic with cold as well as hot water	The reaction is less violent but calcium react with cold as well as hot water	Magnesium do not react with cold water it react with hot water

17. Carbon, a member of group 14, forms a large number of carbon compounds estimated to be about three million. Why is this property not exhibited by other elements of this group ? Explain. 3

Sol. The reason is, the formation of strong bonds by carbon due to its small size. This enables the nucleus to hold on to the shared pairs of electrons strongly. The bonds formed by elements having larger atoms of this group are much weaker and also the carbon has the unique ability to form bonds with other atoms carbon, giving rise to large molecules. This property is catenation.

18. A cheetah, on seeing a prey, moves towards him at a very high speed. What causes the movement of his muscles ? How does the chemistry of cellular components of muscles change during this event ? 3

Sol. The fore-brain is the main thinking part of the brain. It has regions which receive sensory impulses from various receptors.
Separate areas of the fore-brain are specialized for hearing, smell, sight and so on. There are separate areas of association where this sensory information is interpreted by putting it together with information from other receptors as well as with information that is already stored in the brain. Based on all this, a decision is made about how to respond and the information is passed onto the motor areas which control the movement of voluntary muscles, for example, Cheetah's leg muscles.
The chemistry of cellular components of muscles changes during this event.
In the first step break - down of glucose, a six-carbon molecule, into a three - carbon molecule called pyruvate takes place.
In the second step break-down of pyruvate using oxygen takes place in the mitochondria.

19. Define geotropism. Draw a labelled diagram of a plant showing geotropic movements of its parts. 3

Sol. Geotropism : Response of a plant to gravity is called Geotropism. If the plant part moves in the direction of gravity, it called Positive Geotropism. The roots of a plant move downwards in the direction of gravity, so the roots of a plant show positive geotropism. The stem (or shoot) of a plant moves upwards against the direction of gravity, so the stem (or shoot) of a plant shows Negative Geotropism.

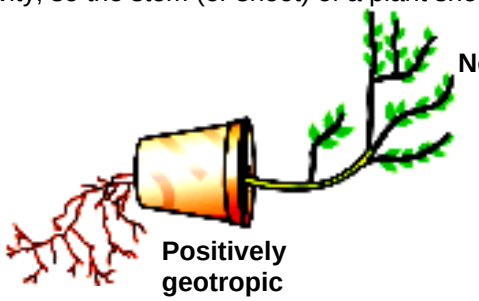


Fig : Plant showing geotropism

20. Define the term evolution. "Evolution cannot be equated with progress." Justify this statement. 3

Sol. Evolution is the formation of complex organisms through 'change from simple ancestral types over the course of geological time. Evolution cannot be equated with progress because it is used to describe the slow and gradual process by which living organisms have undergone changes from the simplest unicellular forms of life to the most complex multicellular forms that can be seen today.

OR

"During the course of evolution, organs or features may be adapted for new functions." Explain this fact by choosing an appropriate example. 3

Sol. (i) Organs or features can be adopted to new. functions during evolution Example - Feathers were developed form providing insulation in cold weather (in dinosaurs) but in birds they were adopted for flight.

(ii) “Older body designs are not inefficient”. Example - Simplest life forms like Bacteria, which inhibit most inhospitable habitats like , hot springs, dead sea, thermal vents and ice in Antarctica.

21. A concave mirror is used for image formation for different positions of an object. What inferences can be drawn about the following when an object is placed at a distance of 10 cm from the pole of a concave mirror of focal length 15 cm ?

(a) Position of the image

(b) Size of the image

(c) Nature of the image

Draw a labelled ray diagram to justify your inferences. 3

Sol. u = – 10 cm

f = – 15 cm

(a) By mirror formula

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

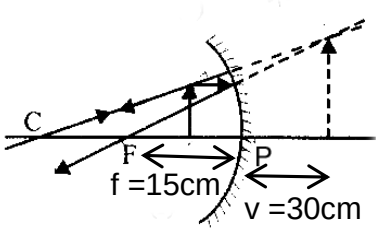
$$\frac{1}{-15}=\frac{1}{v}+\frac{1}{(-10)}$$

$$\frac{1}{v}=\frac{-1}{15}+\frac{1}{10}=\frac{-2+3}{30}$$

v = 30 cm Position of image v = 30 cm from the pole.

(b) $m=\frac{h_I}{h_0}=\frac{-v}{u}=\frac{-30}{-10}=3$ (Enlarged)

(c) Virtual and erect



22. The refractive index of a medium `x' with respect to a medium `y' is 2/3 and the refractive index of medium `y' with respect to medium `z' is 4/3. Find the refractive index of medium `z' with respect to medium `x'. If the speed of light in medium `x' is 3 x 10^8 ms^{-1}, calculate the speed of light in medium 'y'. 3

Sol. $\mu_{xy} = \frac{\mu_x}{\mu_y} = \frac{2}{3}$

$\mu_{yz} = \frac{\mu_y}{\mu_z} = \frac{4}{3}$

$\mu_{zx} = ?$

$v_x = 3 \times 10^8$ m/s

$v_y = ?$

$\mu_{zx} = \frac{\mu_z}{\mu_x}$

$\mu_{zx} = \frac{\mu_z}{\mu_x} \times \frac{\mu_y}{\mu_y}$

$\frac{\mu_y}{\mu_x} \times \frac{\mu_z}{\mu_y} = \frac{3}{2} \times \frac{3}{4}$

$\mu_{zx} = \frac{9}{8}$

$\because \quad \mu \propto \frac{1}{v}$

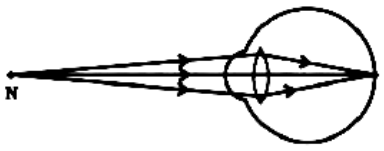
$\frac{\mu_x}{\mu_y} = \frac{v_y}{v_x} \Rightarrow \frac{2}{3} = \frac{v_y}{3 \times 10^8}$

$v_y = 3 \times 10^8 \times \frac{2}{3}$

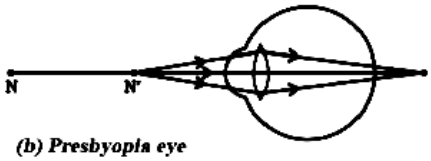
$v_y = 2 \times 10^8$ m/s

23. A person may suffer from both myopia and hypermetropia defects.
(a) What is this condition called ?
(b) When does it happen ?
(c) Name the type of lens often required by the persons suffering from this defect. Draw labelled diagram of such lenses. 3

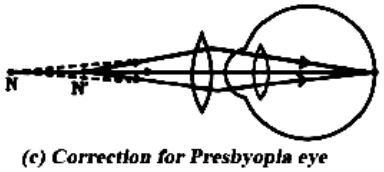
Sol. **(a)** PRESBYOPIA : With increasing age the capability of eye to focus on nearby objects reduces because the decrease in power of accommodation of eye. This defect is called presbyopia. Person suffering from this defect can neither see near by objects nor distant objects clearly.
(b) It happen when ciliary muscles become weak and flexibility of eye lens decreases.
(c) Bifocal lens



(a) Near point of a Presbyopia eye



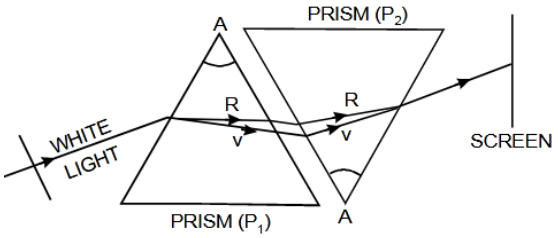
(b) Presbyopia eye



(c) Correction for Presbyopia eye

24. How will you use two identical glass prisms so that a narrow beam of white light incident on one prism emerges out of the second prism as white light ? Draw and label the ray diagram. 3

Sol. **Recombination of the Spectrum :** This experiment was first done by Isaac Newton. For this experiment, two prisms P_1 and P_2 of the same material and of the same refracting angle A are arranged as shown in figure. White light or sunlight from a narrow slit S falls on the first prism P_1 with its base down wards and gets dispersed into constituent colours (VIBGYOR) and the bending takes place downwards. Now this dispersed light falls on the second prism P_2 with its base upwards so that it deviates the light upwards



It is found that the light coming out of the second prism P_2 is almost white and is in direction parallel to the directionof light incident on the first prism P_1. In fact, the two prisms P_1 and P_2 combined togethereffectively acts like a parallel sided glass slab. This showsthat the prism P_1 simply disperses the white light into itsconstituent colours and the prism P_2 recombines thesecolours to form white light.The prism P_1 is called dispersing-prism and the prism P_2 is known as recombination-prism.

SECTION-C

25. A cloth strip dipped in onion juice is used for testing a liquid 'X'. The liquid `X' changes its odour. Which type of an indicator is onion juice ?
The liquid `X' turns blue litmus red. List the observations the liquid `X' will show on reacting with the following : -
(a) Zinc granules
(b) Solid sodium carbonate
Write the chemical equations for the reactions involved. 5

Sol. Onion juice is an olfactory indicator
(a) $Zn + 2HCl \rightarrow ZnCl_2 + H_2$
When a burning match stick is brought close to the mouth of test tube, the gas burns with a pop sound.
(b) $Na_2CO_3 + 2HCl \rightarrow 2NaCl + H_2O + CO_2$
CO_2 is release which turns lime water milky.

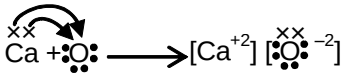
OR

Define water of crystallisation. Give the chemical formula for two compounds as examples. How can it be proved that the water of crystallisation makes a difference in the state and colour of the compounds ? 5

Sol. Water of crystallization is the fixed number of water molecules present in one formula unit of a salt.
Eg. $CuSO_4.5H_2O$(Blue), $FeSO_4.7H_2O$(Green). By heating these crystals they loses their water molecules and hence result in change in state and colour takes place.

26. (a) (i) Write two properties. of gold which make it the most suitable metal for ornaments.
(ii) Name two metals which are the best conductors of heat.
(iii) Name two metals which melt when you keep them on your palm.
(b) Explain the formation of ionic compound CaO with electron-dot structure. Atomic numbers of calcium and oxygen are 20 and 8 respectively. 5

Sol. (a) (i) It is lustrous and malleable.
(ii) Ag, Cu
(iii) Gallium, Caesium
(b) $Ca \rightarrow Ca^{+2} + 2e^-$
2, 8, 8, 2 2, 8, 8
$O + 2e^- \rightarrow O^{-2}$
2, 6 2, 8



Formation of CaO

27. (a) Why is nutrition necessary for the human body ?
(b) What causes movement of food inside the alimentary canal ?
(c) Why is small intestine in herbivores longer than in carnivores ?
(d) What will happen if mucus is not secreted by the gastric glands ? 5

Sol. (A) Human body need the energy to perform various activities. The energy is supplied by the nutrients. Human body require various raw materials for growth and repair. These raw material are provided by nutrients.
(B) The lining of canal has muscles that contract rhythmically in order to push the food forward. These peristaltic movements occur all along the gut.
(C) The length of the small intestine differs in various animals depending on the food they eat. Herbivores eating grass need a longer small intestine to allow the cellulose to be digested. Meat is easier to digest, hence carnivores like tigers have a shorter small intestine.
(D) The mucus protects the inner lining of the stomach from the action of the acid under normal conditions. If mucus is not present the wall of the stomach will be harmed due to the presence of acid in the stomach.

28. Draw a neat diagram showing fertilisation in a flower and label (a) Pollen tube, (b) Male germ cell and (c) Female germ cell, on it. Explain the process of fertilisation in a flower. What happens to the (i) ovary and (ii) ovule after fertilisation ? 5

Sol. Process of fertilization in a flower :
- Fertilization is a process of fusion of male gamete with the female gamete.
- After reaching to stigma, pollen grains develops a pollen tube.
- This pollen tube grows through the length of style, from where it reaches to ovule.
- Pollen tube contain two male gametes, which is later on released in the embryo sac.
- Here one male gamete fuses with the egg to form a diploid zygote and the other male gamete fuses with the polar nuclei to form a triploid nucleus which is developed into endosperm.

i) The ovule develops a tough coat and is gradually converted into a seed.
ii) The ovary grows rapidly and ripens to form a fruit

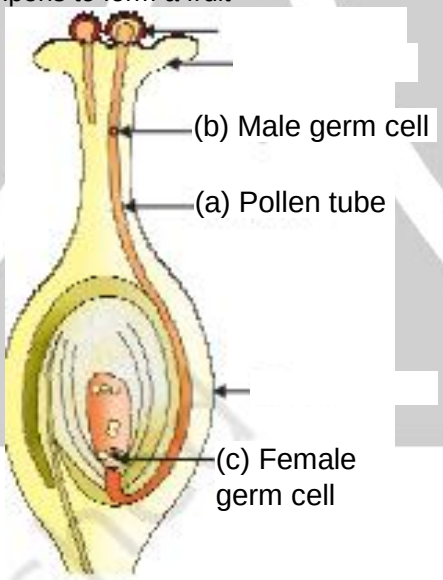


Fig : Fertilisation in a flower

OR

(a) What is puberty ?
(b) Describe in brief the functions of the following parts in the human male reproductive system :
(i) Testes
(ii) Seminal vesicle
(iii) Vas deferens
(iv) Urethra
(c) Why are testes located outside the abdominal cavity ?
(d) State how sperms move towards the female germ cell. 5

Sol. (a) The period of life when production of germ cells, i.e. ova (female) and sperm (male) start in the body. This period of sexual maturation is called puberty.

(b) **(i) Testes :**
- Paired, oval-shaped male sex glands.
- Consist of seminiferous tubules, where the sperms are produced.
- Produce a male sex hormone called testosterone.

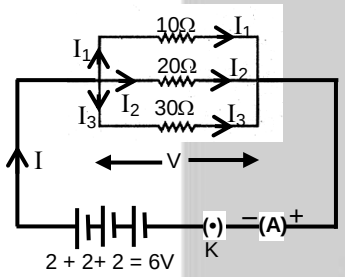
(ii) **Seminal Vesicles :** Fluid and nutrients combine with sperm to form semen, Milky, viscous fluid contains fructose, proteins and other chemicals for nourishing and stimulating sperms.
(iii) **Vas deferens :** • Also known as sperm duct. • Connects testes for the passage of semen
(iv) **Urethra :** Common passage for both the sperms and urine, but never carries both of them at the same time.

(c) Testes are located outside the abdominal cavity in scrotum because sperm formation requires a lower temperature than the normal body temperature

(d) The sperms are tiny bodies that consist of mainly genetic material and a long tail that helps them to move towards the female germ-cell

29. Draw a schematic diagram of a circuit consisting of a battery of 3 cells of 2 V each, a combination of three resistors of 10 Ω, 20 Ω and 30 Ω connected in parallel, a plug key and an ammeter, all connected in series. Use this circuit to find the value of the following :
(a) Current through each resistor
(b) Total current in the circuit
(c) Total effective resistance of the circuit 5

Sol.



(a) V = IR

$$I = \frac{V}{R}$$

So, $I_1 = \frac{V}{R_1} = \frac{6}{10} = 0.6$ A

$I_2 = \frac{V}{R_2} = \frac{6}{20} = 0.3$ A

$I_3 = \frac{V}{R_3} = \frac{6}{30} = 0.2$ A

(b) Total current

$I = I_1 + I_2 + I_3$
$= 0.6 + 0.3 + 0.2$
$I = 1.1$ A

(c) Total effective resistance

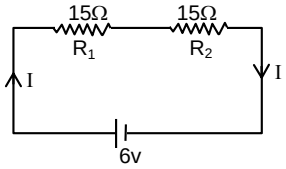
$V = IR$

$$R = \frac{V}{I} = \frac{6}{1.1} = \frac{60}{11}\Omega$$

OR

Two identical resistors, each of resistance 15 Ω, are connected in (i) series, and (ii) parallel, in turn to a battery of 6 V. Calculate the ratio of the power consumed in the combination of resistors in each case. 5

Sol. (i) In series

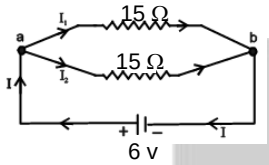


$R_s = R_1 + R_2 \quad = 15 + 15$

$R_s = 30\ \Omega$

$$p_s = \frac{v^2}{R_s} = \frac{6\times 6}{30} = \frac{18}{15}\,w$$

(ii) In Parallel



$$\frac{1}{R_p} = \frac{1}{15} + \frac{1}{15}$$

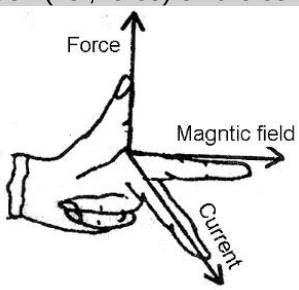
$$\frac{1}{R_p} = \frac{2}{15} \Rightarrow R_p = \frac{15}{2}\Omega$$

$$P_p = \frac{v^2}{R_p} = \frac{72}{15}w$$

$$\frac{P_s}{P_p} = \frac{18}{15}\times\frac{15}{72} = \frac{1}{4}$$

30. (a) State Fleming's Left-hand rule.
(b) List three characteristic features of the electric current used in our homes.
(c) What is a fuse ? Why is it called a safety device ?
(d) Why is it necessary to earth metallic electric appliances ? 5

Sol. **(a) Fleming's left hand rule :** If we stretch the forefinger, middle finger and the thumb of our left hand mutually perpendicular to each other as shown in figure such that the forefinger indicates the direction of the magnetic field and the middle finger indicates the direction of current, then the thumb will indicate the direction of motion (i.e., force) on the conductor.



(b) (i) Appliances to be connect in parallel.
(ii) Each appliance has a separate switch to ON/OFF the flow of current through it.
(iii) Fuse connected to avoid damage.

(c) A fuse is an electical safety device that operates to provide overcurrent protection of an electrical circuit. Its essential component is a metal wire or strip that melts when too much current flows through it thereby stopping or interrupting the current. So it is also called a safety device.

(d) The metallic body of electric appliances is connected to the earth wire so that any leakage of electric current is transfered to the ground. This prevents severe electric shock to the user. That is why earthing of the electrical appliances is necessary**.**