SAMPLE QUESTION PAPER
SCIENCE & TECHNOLOGY (212)

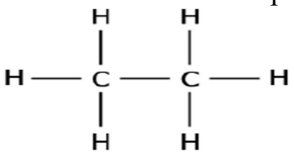
Time: 2½ hrs **Maximum Marks: 85**

Note:

i. This question paper consists of 43 questions in all.
ii. All questions are compulsory.
iii. Marks are given against each question.
iv. **Section A** consists of
   a. **Q.No. 1 to 17** – Multiple Choice type questions (MCQs) carrying 1 mark each. Select and write the most appropriate option out of the four options given in each of these questions.
   b. **Q.No. 18 to 28** – Objective type questions. **Q.No. 18 to 27** carry 02 marks each (with 2 sub-parts of 1 mark each) and **Q.No. 28** carries 05 marks (with 5 sub-parts of 1 mark each). Attempt these questions as per the instructions given for each of the questions 18 – 28.
v. **Section B** consists of
   a. **Q.No. 29 to 34** – Very Short questions carrying 02 marks each to be answered in the range of 30 to 50 words.
   b. **Q.No. 35 to 41** – Short Answer type questions carrying 03 marks each to be answered in the range of 50 to 80 words.
   c. **Q.No. 42 to 43** – Long Answer type questions carrying 05 marks each to be answered in the range of 80 to 120 words.
   (An internal choice has been provided in some of the questions in **Section B**. You have to attempt only one of the given choices in such questions.)

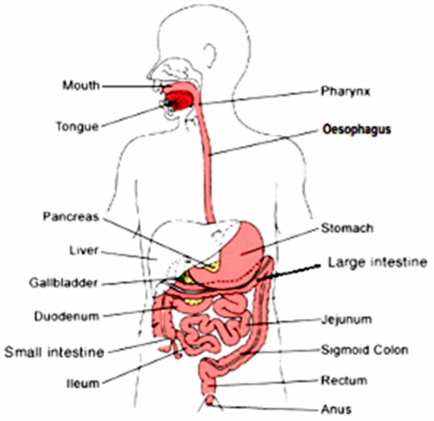
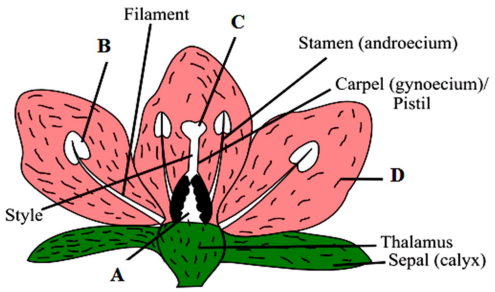
SECTION – A		
Q. No.	Questions	Marks
Q.No. 1 to 17 are the Multiple Choice Questions of 1 mark each:		
1.	A standard unit must have the following characteristics to be useful a) relevant b) convenient c) well defined d) All of the above	1
2.	Derived SI unit of power is a) kg m^2s^{-3} b) kg $m^{-1}s^{-3}$ c) kg $m^{-2}s^{-2}$ d) kg^{-1} $m^{-2}s^{-3}$	1
3.	A compound forms between a metal and a non-metal. It is? a) ionic b) metallic c) covalent d) None of this	1
4.	A substance which has a high melting point, conducts electricity when dissolved in water, and has a crystalline structure probably has what type of bond? a) Ionic b) Metallic c) Covalent d) Crystalline	1
5.	Which of the following element is stable and generally do not form compound? a) Sodium	1

	b) Neon c) Potassium d) Chlorine	
6.	Which of the following is momentum closely related to a) Impulse b) Power c) Force d) Kinetic energy	1
7.	Which of the following is true of the third law of motion? a) Action-Reaction pair always acts on the same body. b) They act on different bodies in opposite directions c) Action-Reaction pairs have the same magnitudes and directions d) Act on either body at normal to each other	1
8.	Which one of the following is not the unit of energy? a) Joule b) Newton meter c) kilowatt d) kilowatt hour	1
9.	The potential energy of the boy is maximum, when he is a) Standing b) Sleeping on the ground c) Sitting on the ground d) None of the above	1
10.	A body is falling from a height h. After it has fallen a height h/2, it will posses a) Only potential energy b) Only kinetic energy c) Half kinetic energy and half potential energy d) More kinetic energy and less potential energy	1
11.	A person can receive blood from a person having any blood group. Her own blood group is a) O b) A c) B d) AB	1
12.	A child will be male because of a) The X chromosome in the zygote b) The Y chromosome in the zygote c) The cytoplasm of germ cell which determines the sex d) Chance only	1
13.	Which of the following method of contraception gives protection from acquiring STDs? a) Surgery b) Condoms c) Copper-T d) Oral-pills	1
14.	The electronic configuration of an element is found to be 2, 4. How many bonds	1

	can one carbon atom form in a compound? a) 1 b) 2 c) 4 d) 6	
15.	The image represents the structure of a carbon compound known as ethane.  Which option explains the naming of ethane? a) the presence of functional group connected with a single bond b) as it contains two carbon atoms and a single bond connects the carbon atoms c) carbon compound with a total number of eight atoms are named as ethane d) as it contains six hydrogen atoms and a single bond connects the carbon and hydrogen atom	1
16.	Which of the following leads to depletion of ozone layer a) Carbon dioxide b) Carbon Monoxide c) Nitrogen d) CFC	1
17.	Though, not completely under human control, prevention of loss of lives from natural disasters may be possible by a) Early warning systems b) Having plans to leave at the right time c) Building shelters near homes d) (a) & (b)	1
	<u>Q.No. 18 to 27</u> are the objective questions of 2 marks each:	
18.	**Match column –I statement with the right option of column - II**	1 X 2

Column –I	**Column - II**
(i) 10 μg (ii) 1 Gm	P. 10^{-6} g Q. 10^{-5} g R. 10^{3} Mm S. 10^{-3} Mm

19.	**Complete the following sentence by given options below:** *(3,4,5,6, Nitrogen, Hydrogen, oxygen).*	1 X 2
(i)	The element whose atom has 7 protons and 8 neutrons in its nucleus is _____.	
(ii)	The number of electrons in the L – shell of atom of oxygen (Z=8) are _____	
20.	**Write TRUE (T) for correct statement and FALSE (F) for incorrect**	1 X 2

	statements:	
(i)	Ionic compounds have low melting point than a covalent compound. _____	
(ii)	Solid sodium chloride is a good conductor of electricity. _____	
21.	**Read the passage and answer the questions that follow it. (i to ii)**	1 X 2
	Alimentary canal is a long continuous tube constituted made by mouth, pharynx, oesophagus, stomach, small intestine, large intestine, and rectum. The glandular organs, salivary glands, liver and pancreas and the alimentary canal form the digestive system. The process of digestion requires enzymes present in the digestive juices secreted by the organs of digestive system. They convert complex substances into simpler ones. Enzymes are chemicals which speed up chemical reactions taking place in cells. 	
(i)	The oesophagus or the food pipe by the contraction of muscles in its wall pushes the food into the stomach. This Muscle movement is termed as _____	
(ii)	An incomplete equation for the digestion of starch by saliva is shown as: Saliva + Starch → What will be the likely outcome of this? (a) Saliva will convert starch into complex fat molecules. (b) Saliva will convert starch into complex sugar molecules. (c) Saliva will breakdown starch into simple sugar molecules. (d) Saliva will breakdown starch into simple protein molecules.	
22.	**Read the passage and answer the questions that follow it. (i to ii)**	1 X 2
	The reproductive organ of flowering plants is the flower. Stamens (Androecium) which produce pollen are the male part. Pollen grains contains male sex cells. There may be several stamens in each flower 	
(i)	In the diagram shown above, which part of the flower becomes fruit post-fertilisation? (a) A (b) B (c) C (d) D	
(ii)	In the diagram shown above, which part of the flower bears pollen grains? (a) A (b) B (c) C	

	(d) D	
	Alternative Question for Visually impaired candidates: **Fill in the blanks:** (i) Agents like wind, water or _____ help to transfer pollen from one flower to another. (ii) Formation of _____ will not occur after pollination if all the ovules had been removed from flower.	
23.	**Write TRUE for correct statement and FALSE for incorrect statements:**	1 X 2
(i)	Calcium carbide is an inorganic compound.	
(ii)	IUPAC name of C_2H_6 is Ethene.	
24.	**Match column –I statement with the right option of column - II**	1 X 2

Column –I	**Column - II**
(i) CO_2 (ii) CaO	P. acidic oxides Q. Basic oxides R. Amphoteric oxides S. Neutral oxides

25.	**Fill in the blanks:**	1 X 2
(i)	Accumulation of non- Biodegradable chemicals in the food chain in increasing amount at each higher trophic level is known as _____	
(ii)	The intensity of an earthquake is measured on the _____ scale.	
26.	**Write TRUE for correct statement and FALSE for incorrect statements:**	1 X 2
(i)	The energy flow in a food chain is unidirectional.	
(ii)	Tsunami occurs due to cloudburst.	
27.	**Read the passage and answer the questions that follow it. (i to ii)**	1 X 2
	Mass of a body is the quantity of matter contained in the body. Mass of an object is constant and does not change from place to place. It remains the same whether the object is on earth, on moon or anywhere in outer space. The **weight** of an object is the gravitational force which is acting on it. The relation between force and acceleration is given by Force = Mass × Acceleration Therefore, F = mg If weight of an object is denoted by W, then W = mg As the value of acceleration due to gravity 'g' changes from place to place, therefore weight of a body is not constant. For example, on moon the value of 'g' is approximately $\frac{1}{6}$th of its value on earth.	
(i)	**Vikram lander with Pragyan rover** was sent by **ISRO** near the south pole of moon in the **Chandrayan – 3 mission.** Their combined mass as measured on earth is found approximately 1800 kg on earth. What will be their combined mass on moon?	
	(a) 300 kg	

	(b) 600 kg (c) 1800 kg (d) 10800 kg	
(ii)	What is the combined weight of Vikram lander and Pragyan rover on earth? (Take g = 10 m/s^2 on earth) (a) 3000 N (b) 6000 N (c) 18000 N (d) 108000 N	
28.	**Read the passage and answer the questions that follow it.**	1 X 5
	If force and displacement are in the same direction one can easily find work done by finding their product. But if force and displacement are in different directions the work done is obtained by finding the product of force and the projection of displacement in the direction of the force. The SI Unit of work is joule (J).	
(i)	Work done will be positive when the angle between the force and displacement is: a) 0^0 and 45^0 b) 90^0 and 180^0 c) 90^0 and 45^0 d) 180^0 and 45^0	
(ii)	In case of negative work the angle between the force and displacement is a) 0^0 b) 45^0 c) 90^0 d) 180^0	
(iii)	Work done will be zero when the angle between the force and displacement is: a) 0^0 b) 45^0 c) 90^0 d) 180^0	
(iv)	A person is carrying a heavy load on his head and moving on a level road. What will be the work done by him against gravity? a) Positive b) Negative c) Zero d) Either Positive or Negative	
(v)	1 joule is equal to a) 1 N b) 1 N/m c) 1 Nm d) 1 N/m^2	
	SECTION – B	
29.	Write one example of each of: (i) A metal which is so soft that, it can be cut with knife and a non-metal which is the hardest substance.	2

	(ii) A metal and a non-metal which exist as liquid at room temperature. **OR** What is galvanization? Why it is done?	
30.	Mention the names of the metals for the following: (i) Two metals which are alloyed with iron to make stainless steel. (ii) Two metals which are used to make jewellery.	2
31.	State the Modern Periodic Law for classification of elements. How many (a) Groups and (b) Periods are there in the Modern Periodic Table? **OR** How does the tendency to lose electrons change in a group and why?	2
32.	Why the colour of dry blue litmus paper does remains unchanged even when it is brought in contact with dry HCl gas?	2
33.	What is the function of an earth wire? Why is it necessary to earth electrical appliances? **OR** On what factors do the resistance of conductor depends? Give its mathematical expression. Give the SI unit of resistivity.	2
34.	Write two functions each of the following components of transport system. (i) Blood (ii) Lymph	2
35.	(i) Explain the action of dilute hydrochloric acid on the following with chemical equation: (a) Magnesium ribbon (b) Sodium hydroxide (c) Crushed egg shells **OR** (ii) A white coloured powder is used by doctors for supporting fractured bones. (a) Write chemical name and formula of the powder. (b) When this white powder is mixed with water a hard solid mass is obtained. Write balanced chemical equation for the change.	3
36.	(i) Give the constituents of baking powder. (ii) Why cake or bread swells on adding baking powder? Write chemical equation.	3
37.	Suppose that the radius of the earth becomes twice of its original radius without any change in its mass. Then what will happen to your weight? **OR** The mass of the Sun is 2×10^{30} kg and that of the Earth is 6×10^{24} kg. If the average distance between the Sun and the Earth is 1.5×10^{11} m, calculate the force exerted by the Sun on the Earth and also by Earth on the Sun.	3
38.	How does chemical coordination take place in animals? Mention one function for each of the following glands? 1. Pituitary gland 2. Thyroid gland 3. Pancreas gland	3

	OR Write the functions of : (*a*) Fore brain (*b*) Mid brain (*c*) Hind brain	
39.	Draw diagram of Human Respiratory system and label the following parts: 1. Diaphram 2. Bronchiole 3. Wind pipe	3
40.	What is meant by food chain? Briefly describe a detritus food chain.	3
41.	With the help of labelled diagram the various steps involved in the carbon cycle. Mention two ways by which human activities have been interfering with nature	3
42.	Draw the ray diagram in each case to show the position and nature of the image formed when the object is placed: (i) at the centre of curvature of a concave mirror (ii) between the pole P and focus F of a concave mirror (iii) in front of a convex mirror (iv) at 2F of a convex lens (v) in front of a concave lens **OR** With the help of a labelled diagram, explain the working of an A.C. generator.	5
43.	(i) How are the following related? (a) Number of valence electrons of different elements in the same group. (b) Number of shells of elements in the same period. (ii) How do the following change? (a) Number of shells of elements as we go down a group. (b) Number of valence electrons of elements on moving from, left to right in a period. (c) Atomic radius in moving from left to right along a period. **OR** An element 'X' belongs to third period and second group of the Modern Periodic Table. (a) Write its electronic configuration. (b) Is it a metal or non-metal? Why? (c) Write the formula of the compound formed when 'X' reacts with an element (i) Y of electronic configuration 2, 6 and (ii) Z of electronic configuration 2, 8, 7.	5

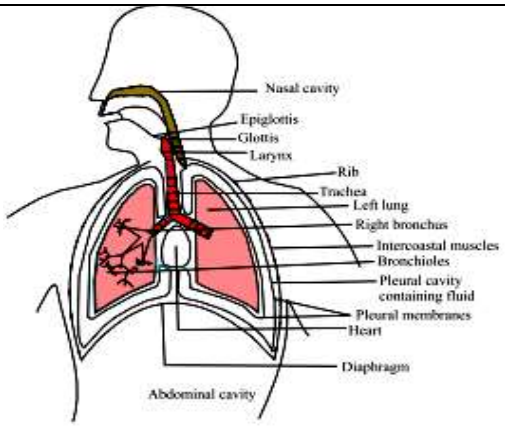
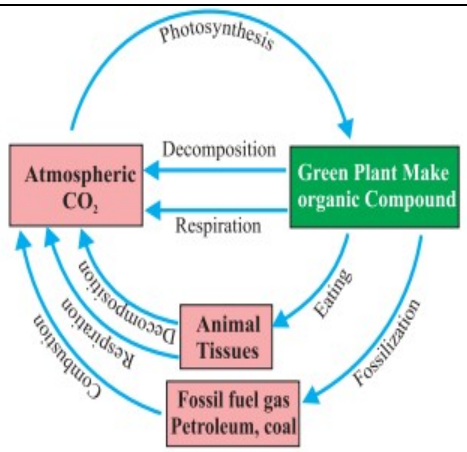
Sample question paper
Marking Scheme
Science & Technology

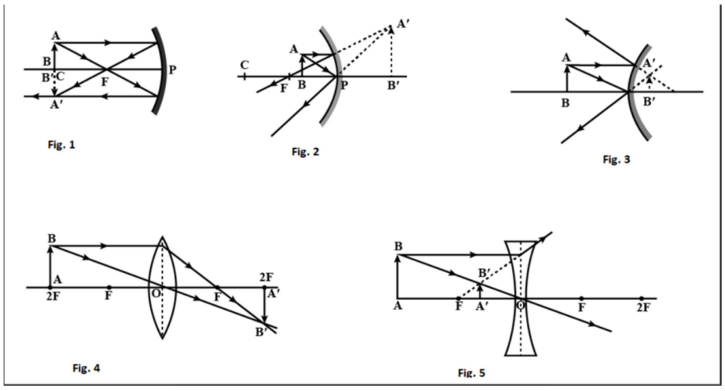
Q. No.	**SECTION – A**	Marks
1.	d) All of the above	1
2.	a) kg m^2s^{-3}	1
3.	a) ionic	1
4.	a) ionic	1
5.	b) Neon	1
6.	a) Impulse	1
7.	b) They act on different bodies in opposite directions	1
8.	c) kilowatt	1
9.	a) standing	1
10.	c) Half kinetic energy and half potential energy	1
11.	a) AB	1
12.	b) The Y chromosome in the zygote	1
13.	b) Condoms	1
14.	c) 4	1
15.	b) as it contains two carbon atoms and a single bond connects the carbon atoms.	1
16.	d) CFC	1
17.	d) (a) & (b)	1
18.	(i) – Q, (ii) - R	1X2
19.	(i) Nitrogen (ii) 6	1X2
20.	(i) F (ii) F	1X2
21.	(i) peristaltic movement (ii) (c) Saliva will breakdown starch into simple sugar molecules.	1X2
22.	(i) (a) A (ii) (b) B *Alternative Question for Visually impaired candidates:* (i) insects (ii) Fruit	1X2
23.	(i) T (ii) F	1X2
24	(i)-(P) (ii)-(Q)	1X2
25.	(i) Bio – magnification (ii) Richter Scale	1X2
26.	(i) T (ii) F	1X2
27.	(i) (c) 1800 kg (ii) (c) 18000 N	1X2
28.	(i) (a) 0^0 and 45^0 (ii) (d) 180^0 (iii) (c) 90^0	1X5

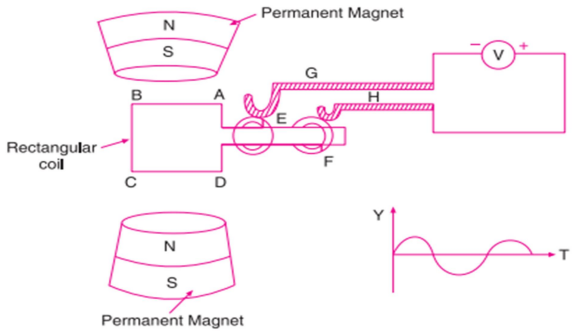
	(iv) (c) Zero (v) (c) 1Nm	

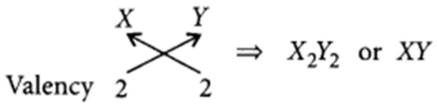
	SECTION – B		
29.	(i) Sodium, carbon (diamond). (ii)Mercury is liquid metal, bromine is liquid non-metal. OR Galvanisation is a process of depositing a thin layer of zinc metal on iron objects. This is done to prevent rusting of iron by protecting it to come in contact with air and moisture. Zinc metal, being more reactive, reacts with air to form hard layer of zinc oxide, which prevents air from passing through it.	1 1 OR 1 1	2
30.	(i) Nickel and chromium. (ii) Gold and platinum.	½+½ ½+½	2
31.	'Properties of elements are the periodic function of their atomic number.' (a) There are 18 groups and (b) 7 periods in the Modern Periodic Table. OR Tendency of an element to lose electrons increases when we go down the group. This is because atomic size increases when we go down the group and therefore the force of attraction of nucleus for the valence electrons decreases down the group	1 ½ ½ OR 1+1	2
32.	The colour of litmus paper changes only in the presence of ions like hydrogen (H^+) ions. HCl can produce these ions only in the form of aqueous solution i.e. when dissolved in water. Therefore, dry HCl gas does not change the colour of dry litmus paper.	2	2
33.	The metallic part of an electric appliance is connected to the earth by means of earth wire so that any leakage of electric current is transferred to the ground. This prevents any electric shock to the person using the electrical appliance. Therefore, earthing of the electrical appliances is necessary. OR Factors on which the resistance of conductor depends: (i) length of conductor (ii) Area of cross section $R = \frac{\rho l}{A}$ SI unit of Resistivity is: Ωm	1+1 OR ½X4	2
34.	***Any two function of each*** **(i) Blood:** (a) Blood carries nutrients, oxygen, carbon dioxide, hormones and waste material to the relevant parts of the body. (b) Fights infections through its WBCs (c) Prevents its own loss through Blood clotting with the help of Blood platelets. **(ii) Lymph:** a) return interstitial fluid to blood. b) transport O_2 to the brain.	½X4	2

	c) transport CO_2 to lungs. d) return RBCs and WBCs to lymph vessels.		
35.	(i) (a) Hydrogen gas will be formed $Mg\ (s) + 2HCl\ (dil) \longrightarrow MgCl_2\ (aq) + H_2\ (s)$ (b) Sodium chloride and water will be formed $NaOH + HCl \longrightarrow NaCl + H_2O$ (c) Crushed egg shell are made up of $CaCO_3$ which reacts with dil HCl to give brisk effervescence due to CO_2 $CaCO_3\ (s) + 2HCl \longrightarrow CaCl_2 + H_2O + CO_2$ **OR** (ii) (a) The chemical name and formula of the white coloured powder which is used by doctors for supporting fractured bones is: Chemical name - Calcium sulphate hemihydrate Formula - $CaSO_4.\frac{1}{2}H_2O$. (b) When this white powder is mixed with water a hard-solid mass is obtained. The balanced chemical equation for the change is $CaSO_4.\frac{1}{2}H_2O + \frac{3}{2}H_2O \rightarrow CaSO_4.2H_2O$.	1 1 1 OR ½+½ 2	3
36	(i) Baking powder containing sodium hydrogen carbonate and tartaric acid. (ii)It is due to the formation of carbon dioxide sodium bicarbonate in baking powder. $2NaHCO_3\ (s) \xrightarrow{heat} Na_2CO_3\ (s) + CO_2\ (g) + H_2O\ (l)$	½+½ 1 1	3
37.	We know that $F = GMm/r^2$ as weight of a body is the force with which a body is attracted towards the earth, $\therefore W = GMm/r^2$ If the radius of the earth becomes twice of its original radius, then $W = GMm/(2r)^2$ $= GMm/4r^2 = W/4$ i.e., weight will be reduced to one-fourth of the original. OR Mass of the Sun, $M = 2 \times 10^{30}$ kg Mass of the Earth, $m = 6 \times 10^{24}$ kg Distance between the Sun and the Earth, $r = 1.5 \times 10^{11}$ m Gravitational force between two masses is given by, $F = GMm/r^2$ $\therefore F = 3.6 \times 10^{22}$N	1 1 1 OR 1 2	3
38.	Chemical coordination takes place in animals with the help of hormones. Hormones are the chemical fluids that are secreted by the glands of the	1½	3

	endocrine system. Hormones regulate the overall growth and development of animals. **Gland---------Name of the Hormone** Pituitary secretes Growth hormone. Thyroid secretes Thyroid Hormone/ Thyroxin. Pancreas secretes Insulin. OR Functions of (*a*) Fore brain: Thinking part of the brain and Control the voluntary actions. (*b*) Mid brain: It connects the forebrain with the hindbrain. (*c*) Hind brain: Maintains posture and balance of the body. Control the voluntary actions.	½ ½ ½ OR 1 1 1	
39.	 **Remarks:** The parts mentioned in the question are to be labelled properly.	1½ (Diag.) + ½X3 (Label)	3
40.	Food Chain is defined as Succession of organisms in an ecological community that constitute a passing on of food energy from one organism to another as each consumes a lower member and in turn is preyed upon by a higher member of the food chain. Detritus food chain is a kind of food chain that starts with dead organic matter. Dead organic matter $\xrightarrow[\text{by micro-organisms}]{\text{broken down}}$ simpler nutrients $\xrightarrow{\text{consumed by}}$ small carnivores $\xrightarrow[\text{up}]{\text{eaten}}$ Carnivorous	1 2	3
41.	 Factories, vehicles, burning wood.	2 1	3

42.	**Fig. 1:** **Nature of image: Real, inverted and same size image is formed at the centre of curvature.**  Fig. 1 Fig. 2 Fig. 3 Fig. 4 Fig. 5 Fig.2: Nature of image: Virtual, enlarged and erect image is formed behind the mirror. Fig3: Nature of image virtual erect and diminished image is formed behind the mirror Fig.4: Nature of image real inverted and size to size image formed at 2F on the other side of lens Fig5: **Nature of image: Virtual, erect and diminished image is formed between O and F on the same side of object** **OR** "A. C. generator" means "Alternating Current generator". That is, an A. C. generator produces alternating current, which alternates (changes) in polarity continuously. **Construction of an A. C. Generator** A simple A. C. generator consists of a rectangular coil ABCD that can be rotated rapidly between the poles N and S of a strong horseshoe type magnet M. The coil is made of a large number of turns of insulated copper wire. The ends A and D of the rectangular coil are connected to two circular pieces of copper metal called slip rings R_1 and R_2. As the slip rings R_1 and R_2 rotate with the coil, the two pieces of carbon called brushes, B_1 and B_2, keep contact with them. So, the current produced in the rotating coil can be tapped out through slip rings into the carbon brushes. From the carbon brushes B_1 and B_2 we take the current into various electrical appliances like radio, T. V., electric iron, bulbs, etc. But in this figure, we have shown only a galvanometer G connected the two carbon brushes.	1X5 OR 2	5

	 **Working of an A. C. Generator** Suppose that the generator coil ABCD is initially in the horizontal position. Again suppose that he coil ABCD is being rotated in the anticlockwise direction between the poles N and S of a horseshoe type magnet. . As the coil rotates in the anticlockwise direction, the side AB of the coil moves down cutting the magnetic lines of force near the N-pole of the magnet, and side CD moves up, cutting the lines of force near the S-pole of the magnet. Due to this, induced current is produced in the sides AB and DC of the coil. On applying Fleming's right hand rule to the side AB and DC of the coil, we find that the currents are in the direction B to A and D to C respectively. Thus, the induced currents in the two sides of the coil are in the same direction, and we get an effective induced current in the direction BADC. i. After half revolution, the sides AB and DC of the coil will interchange their positions. The side AB will come on the right hand side and DC will come on the left side. So, after half a revolution, side AB starts moving up and side DC starts coming down. As a result of this, the direction of induced current in each side of the coil is reversed after half a revolution. Since the direction of induced current in the coil is reversed after half revolution so the polarity (positive and negative) of the two ends of the coil also changes after half revolution. The end of coil which was positive in the first half of rotation becomes negative in the second in the second half. And the end which was negative in the first half revolution becomes positive in the second half of revolution. Thus, in 1 revolution of the coil, the current changes its direction 2 times. After every half revolution, each side of the generator coil starts moving in the opposite direction in the magnetic field. The side of the coil which was initially moving downwards in a magnetic field, after half revolution, it starts moving in opposite direction – upwards. Similarly the side of coil which was initially moving upwards, after half revolution, it starts moving downwards. Due to the change in the direction of motion of the two sides of the coil in the magnetic field after every half revolution, the direction of current produced in them also changes after every half revolution.	3	
43.	(i) (a) Different elements in same group have same number of valence electrons. (b) Numbers of shells of elements in same period are equal. (ii) (a) Number of shells of elements goes on increasing down the group. (b) Number of valence electrons of elements goes on increasing on	1 1 1	5

	moving from left to right in a period, e.g. lithium has 1, beryllium has 2, boron has 3, carbon has 4, nitrogen has 5, oxygen has 6, fluorine has 7 and neon has 8 valence electrons.	1	
	(c) Atomic radius goes on decreasing in moving from left to right along a period.	1	
	OR	OR	
	Third period indicates that it has three shells while group 2 indicates that it has two valence electrons in its outermost shell. Thus, X must be magnesium (Mg).		
	(a) Electronic configuration = 2, 8, 2	1	
	(b) As X has two valence electrons in its outermost shell which can be easily lost to form a noble gas configuration, so it is a metal.	2	
	(c) (i) Electronic configuration of Y = 2, 6 Hence, valency of Y = 8 – 6 = 2 Formula of compound formed when X reacts with Y is  $\Rightarrow X_2Y_2$ or XY	1+1	
	(ii) Electronic configuration of Z = 2, 8, 7 Hence, valency of Z = 8 – 7 = 1 Formula of compound formed when X reacts with Z is  $\Rightarrow XZ_2$		