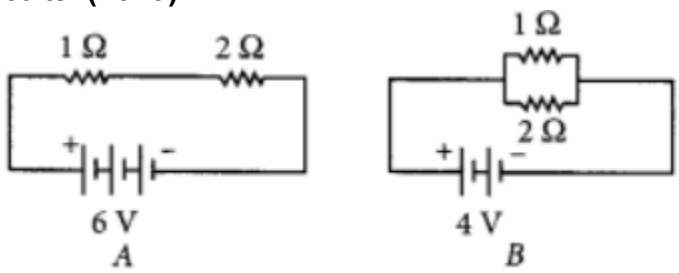
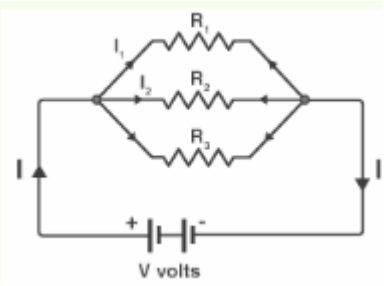
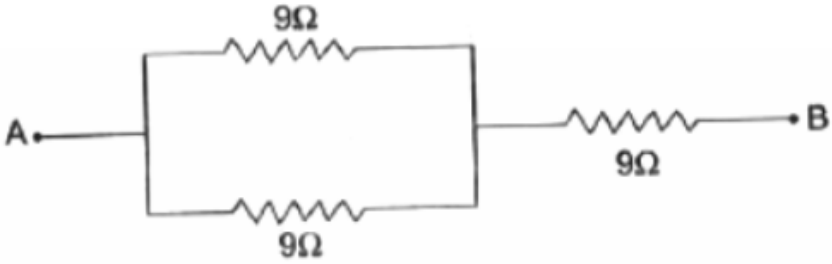
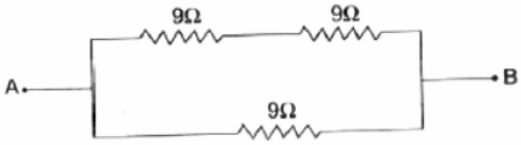
SUBJECT:
CLASS: X

CHAPTER: Electricity No. of PYQs:20

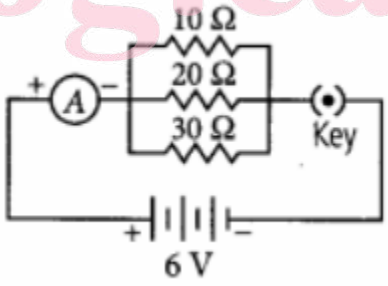
Sl No	QUESTIONS	MARK
1	A current of 10 A flows through a conductor for two minutes. (i) Calculate the amount of charge passed through any area of cross section of the conductor. (ii) If the charge of an electron is 1.6 × 10-19 C, then calculate the total number of electrons flowing. **(Board Term I, 2013)** **Solution :-** I = 10A T= 2min= 120 sec I= 10 = Q/120= Q= 120 0C Now, e = $1.6^{*}\ 10^{-19}$ By Quantization of charge Q = ne 1200 = n * $1.6^{*}\ 10^{-19}$ n = $1200/\ 1.6^{*}\ 10^{-19}$ n = $750^{*}\ 10^{19}$	
2	Name a device that you can use to maintain a potential difference between the ends of a conductor. Explain the process by which this device does so. **(Board Term I, 2013)** **Solution :-** Sources of electricity like a battery or a cell can help to maintain an accurate potential difference across a conductor. A cell is a singular device that converts chemical energy into electric energy.	
3	Compare the power used in 2 Ω. resistor in each of the following circuits. **(2019)**  	

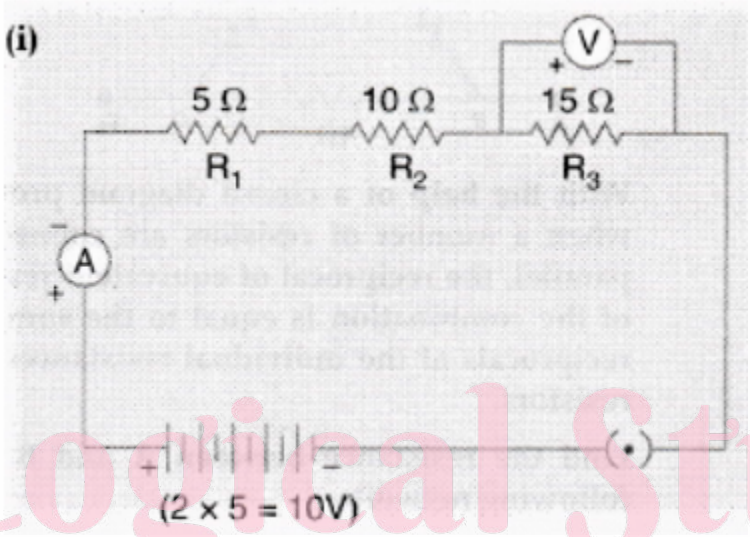
	Solution:- In Series Combination Total Resistance Rs = R1+ R2 Rs = 1 + 2 Ω= 3 Ω Now Current, I= V/Rs I= 6/3= 2A Power in 2 Ω Resistor, Ps= I2R= 2*2*2= 8 W In parallel combination, Total resistance 1/Rp= 1/R1+1/R2 1/Rp= 1/1+1/2 Rp= 2/3Ω Current, I= V/R= 6/2/3= 9 A Power, Pp= V2/R = 6*6/2 = 18 W	
4	(a) How two resistors, with resistances 1Ω and 2 Ω respectively, are to be connected to a battery of emf V volts so that the electrical power consumed is minimum? (b) In a house 3 bulbs of 100 watt each lighted for 5 hours daily, 2 fans of 50 watt each used for 10 hours daily and an electric heater of 1.00 kW is used for half an hour daily. Calculate the total energy consumed in a month of 31 days and its cost at the rate of Rs 3.60 per kWh. **(Board Term I, 2017)** **Solution :-** (a)Power = V^2/R Battery of emf V Hence V is constant. So to get minimum power. R should be maximum. In Series Resistance get added & in Parallel Resistance reduces. Hence Resistors should be connected in Series to get maximum power. Hence minimum power consumption. (b)Given: Total number of bulb =3, Power of bulb, Pb =100W=0.1 kW, Time consumed per day =5 hours daily Total number of fans =2, Power of fans, Pf =50 W=0.05 kW, Time consumed per day =10 hours daily Total number of electric heater =1, Power of heater, Ph =1 kW, Time consumed per day =0.5 hours daily Total number of days =31 Unit rate =Rs.3.60 per kWh Total energy consumed =nPt=31(3×0.1×5+2×0.05×10+1×1×0.5)=93 kWh Total cost of energy =Rs.3.60×93=334.8 kWh	
5	(a) With the help of a suitable circuit diagram prove that the reciprocal of the equivalent resistance of a group of resistances joined in parallel is equal to the sum of the reciprocals of the	

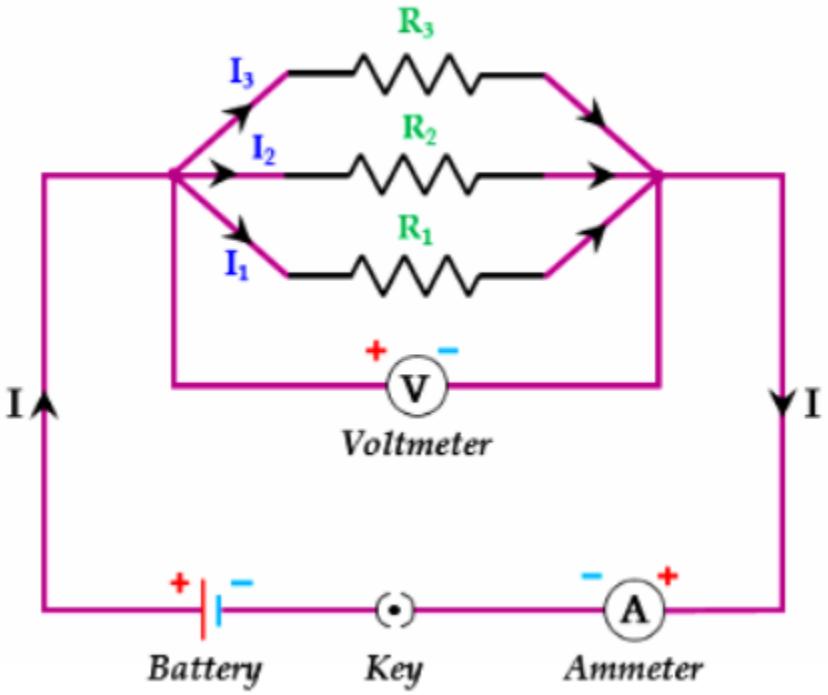
	individual resistances. (b) In an electric circuit two resistors of 12 Ω each are joined in parallel to a 6 V battery. Find the current drawn from the battery. **(Delhi 2019)** Solution :-  (a) Let the total current in the circuit be I. The potential difference be V and the current passing through resistance R1 R2, and R3 will be I1, 12 and I3 respectively. The total current will be, I = I1+ I2 + I3 Step 2: Applying Ohms Law, I1=V/R1. I2 =V/R2 I3 =V/R3 I=V/Req So, the net current will be, V/Req = V/R1 + V/R2 + V/R3 Factoring out V. we get 1/Req = 1/R1 + 1/R2 + 1/R3 Hence proved that the summation of the reciprocals of each resistance is equal to the reciprocal of the equivalent resistance of a set of resistances connected in parallel. (b) 1/Req= 1/R1 + 1/R2 Req = 6Ω V= IR I= V/R = 6/6= 1 A	
6	Show how would you join three resistors, each of resistance 9 Ω so that the equivalent resistance of the combination is (i) 13.5 Ω, (ii) 6 Ω **(2016, 2018)** **Solution :-**	

	 **(ii) To get an equivalent resistance of 6 Ω, the resistances should be connected as shown in the figure given below:** 	
7	Three resistors of 3 Ω each are connected to a battery of 3 V as shown. Calculate the current drawn from the battery. **(Board Term I, 2017)** **Solution :-** 1/R= 1/R1+R2 +1/R3= 1/ 3+ 3 +1/ 3= 1/ 6+ 1/ 3 = ½ R= 2Ω Current drawn from the battery, I = V/R = 3/2 = 1.5 A	
8	Two identical resistors are first connected in series and then in parallel. Find the ratio of equivalent resistance in two cases. **(Board Term I, 2013,2017)** **Solution :-** In Series, Rs= R+R= 2R In parallel, 1/Rp= 1/R+ 1/R Rp= 2/R Rs/Rp = 2R/(R/2) =4:1	
9	If the radius of a current carrying conductor is halved, how does	

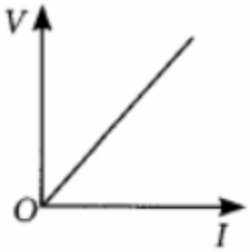
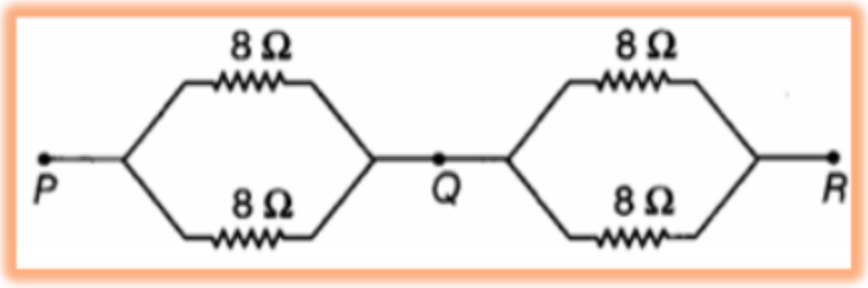
	current through it change? **(2/5 Board Term I, 2014)** **Solution :-** If the radius of conductor is halved, the area of cross-section reduced to (1/4) of its previous value. Since, R ∝ 1/A, resistance will become four times From Ohm's law, V = IR For given V, I ∝ 1/R So, current will reduce to one-fourth of its previous value	
10	Define resistance of a conductor. State the factors on which resistance of a conductor depends. Name the device which is often used to change the resistance without changing the voltage source in an electric circuit. Calculate the resistance of 50 cm length of wire of cross sectional area 0.01 square mm and of resistivity 5 × 10-8 Ω m. **(Board Term I, 2014)** **Solution :-** Resistance is the property of a conductor to resist the flow of charges through it. (i) Resistance of a conductor depends upon the following factors: (1) Length of the conductor : (Treater the length (l) of the conductor more will be the resistance (R). R ∝ l (2) Area ol cross section of the conductor: (Ireater the cross-sectional area of the conductor, less will be the resistance. R ∝ 1/A (3) Nature of conductor. Rheostat is the device which is often used to change the resistance without changing the voltage source in an electric circuit. We are given, length of wire, l = 50 cm = 50 × 10^{-2} m cross-sectional area, A = 0.01 mm² = 0.01 × 10^{-6} m² and resistivity, ρ = 5 x 10^{-8} Ω m. As, resistance, R = ρlA ∴ R = (5×10^{-8}×50×10^{-20}.01×10^{-6}) Ω = 2.5 Ω	
11	List the advantages of connecting electrical devices in parallel with an electrical source instead of connecting them is series. **(Board Term I, 2013)** **Solution :-** (a) When a number of electrical devices are connected in	

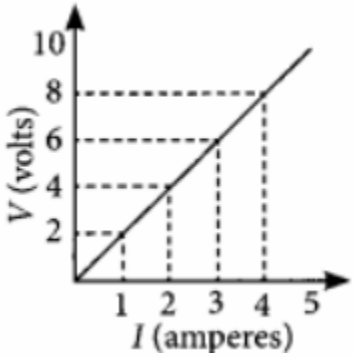
	parallel, each device gets the same potential difference as provided by the battery and it keeps on working even if other devices fail. This is not so in case the devices are connected in series because when one device fails, the circuit is broken and all devices stop working. (b) Parallel circuit is helpful when each device has different resistance and requires different current for its operation as in this case the current divides itself through different devices. This is not so in series circuit where same current flows through all the devices, irrespective of their resistances	
12	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. **(2020)** **Solution :-**  (a) Given, voltage of the battery = 2V + 2V + 2V = 6 V Current through 10 Ω resistance, I_{10} = V/R=6/10 = 0.6 A Current through 20 Ω resistance, I_{20} = V/R=6/20 = 0.3 A Current through 30 Ω resistance, I_{30} = V/R=6/30 = 0.2 A (b) Total current in the circuit, 1= I_{10} + I_{20} + I_{30} = 0.6 + 0.3 + 0.2 = 1.1 A (c) Total resistance of the circuit, $1/R_P$=1/10+1/20+1/30=11/60	
13	Draw a circuit diagram for a circuit consisting of a battery of five	

	cells of 2 volts each, a 5 Ω resistor, a 10 Ω resistor and a 15 Ω resistor, an ammeter and a plug key, all connected in series. Also connect a voltmeter to record the potential difference across the 15 Ω resistor and calculate (i) the electric current passing through the above circuit and (ii) potential difference across 5 Ω resistor when the key is closed. **(Board Term 1, 2013)** **Solution :-**  Equivalent resistance = RI + R2 + R3 = 5 + 10 + 15 = 30Ω Current in the circuit, I = V/R I= 10/30 = 0.33A Potential difference across 5Ω resistor, V = IR = 1/3 x 5 = 1.67 V	
14	(a) Write the mathematical expression for Joules law of heating. (b) Compute the heat generated while transferring 96000 coulomb of charge in two hours through a potential difference of 40 V. **(2017,2020)** Solution :- (a) The Joule's law of healing implies that heat produced in a resistor is (i) directly proportional to the square of current lor a given resistance, (ii) directly proportional to resistance for a given current, and (iii) directly proportional to the time for which the current flows through the resistor. i.e., H = I^2 Rt (b) Given, charge q = 96000 C, time t = 2 h = 7200 s and	

	potential difference V = 40 V We know, $H = I^2Rt = Q^2/t^2 \times V/Q \times t \times t = VQ$ $= 40 \times 96000 = 3.84 \times 106$ J = 3.84 MJ	
15	Two lamps, one rated 100 W; 220 V, and the other 60 W; 220 V, are connected in parallel to electric mains supply. Find the current drawn by two bulbs from the line, if the supply voltage is 220 V. **(2/3, 2018, Board Term I, 2014)** **Solution :-** Since both the bulbs are connected in parallel and to a 220 V supply, the voltage across each bulb is 220 V. Then Current drawn by 100 W bulb, I_1 = powerrating/voltageapplied = 100W/220V = 0.454 A Current drawn by 60 W bulb, I_2 = 60W/220V = 0.273 A Total current drawn from the supply line, $I = I_1 + I_2 = 0.454$ A + 0.273 A = 0.727 A = 0.73 A	
16	Three resistors R1. R2 and R3 are connected in parallel and the combination is connected to a battery, ammeter, voltmeter and key. Draw suitable circuit diagram and obtain an expression for the equivalent resistance of the combination of the resistors.**(2020,2022)** **Solution :-**  Suppose the total current flowing in the circuit is I, then the	

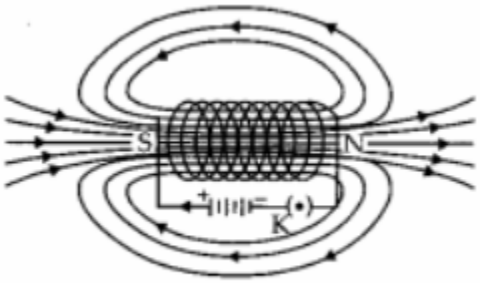
	current passing through resistance R1 will be I1, the current passing through resistance R2 will be I2 and the current passing through resistance R3 will be I3 Thus, the total current I is given as- I = I1 + I2 + I3 ..... (i) Since the potential difference across all the resistors is the same, so applying Ohm's law to each resistor we get- I1 = V /R1 I2 = V /R2 I3 = V /R3 Let equivalent resistance of this parallel combination is Req. Therefore, by applying Ohm's law to the whole circuit, we get- I = V/Req Now, Putting the value of the current I, I1, I2, and I3 in equation (i), we get- V/R e q = V/R 1 + V/R 2 + V/R 3 1/R e q = 1/R 1 + 1/R 2 + 1/R 3 (V = 1, ∵ it is same in the whole circuit) Thus, the equivalent or resultant resistance of a combination of three resistors, of resistance R1, R2, and R3 joined in parallel is 1/R e q = 1/R 1 + 1/R 2 + 1/R 3	
17	(i)State one difference between kilowatt and kilowatt hour. Express 1 kWh in joules. (ii) A bulb is rated 5V; 500 mA. Calculate the rated power and resistance of the bulb when it glows. **(Board Term I, 2013,2015)** Solution :- Kilowatt (kW)- a large unit of electric power Kilowatt hour (kWh) - a commercial unit of electric energy. 1 kWh - 3.6 x 106 Joules Potential difference : 5V current : 500 mA = 500 $\times 10^{-3}$A P =VI =5V×500×10^{-3}A=2.5W R=V/I=5V/500×10^{-3}A×10Ω R=100Ω	
18	State Ohm's law. Draw a labelled circuit diagram to verify this law in the laboratory. If you draw a graph between the potential difference and current flowing through a metallic conductor, what kind of curve will you get? Explain how would you use this graph to determine the resistance of the conductor. **(Board Term I,2014, 2015, 2016)** **Solution :-** It states that the potential difference V, across the ends of a given metallic wire in an electric circuit is directly proportional to the current flowing through it, provided its temperature remains the same. Mathematically, V ∝ I	

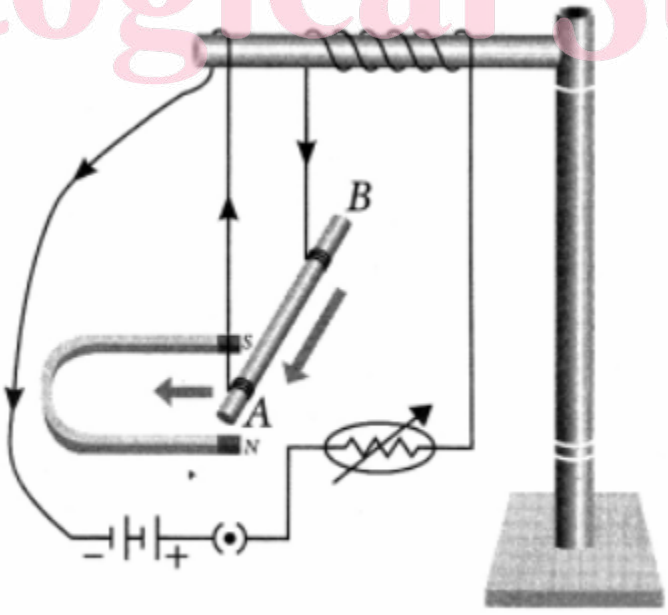
	V = RI where R is resistance of the conductor.  = IR or R = V/I So, the slope of V'-/ graph at any point represents the resistance of the given conductor.	
19	(a) Prove that the equivalent resistance of three resistors R1, R2 and R3 in series is R1 + R2 + R3 (b) You have four resistors of 8 Ω each. Show how would you connect these resistors to have effective resistance of 8 Ω? **(4/5, Board Term I, 2013,2015,2016,)** **Solution :-** The total potential difference across a combination of resistors in series is equal to the sum of a potential difference across the individual resistors. V= V1+V2+V3 Let I be the current in the circuit. The current through each resistor is also I. It is possible to replace the three resistors joined in series by an equivalent resistor of resistance R. Applying Ohm's law, V=IR V1= IR1 V2= IR2 V3= IR3 V = V1+ V2 + V3 IR= IR1+ IR2 + IR3 R= R1+ R2+R3  Two parallel combinations must be connected in series with	

	each other to get the effective resistance of 8Ω. As shown in the figure below. The effective resistance of each of the parallel combination is 4Ω. And this two 4Ω resistors are added together to get 8 Ω effective resistance.	
20	Study the V-I graph for a resistor as shown in the figure and prepare a table showing the values of I (in amperes) corresponding to four different values V (in volts). Find the value of current for V = 10 volts. How can we determine the resistance of the resistor from this graph? **(Board Term I, 2014,2016,2020)**  **Solution :-** Since, the graph is straight line so we can either extrapolate the data or simply mark the value from graph as shown in figure. Current, I(A) Voltage, V(V) 0 0 1 2 2 4 3 6 4 8 Hence, the value of current for V = 10 volts is 5 amperes (or 5 A). From Ohm's law, V = IR, We can write, R = VI At any point on the graph, resistance is the ratio of values of V and I. Since, the given graph is straight line (ohmic conductor) so, the slope of graph will also give the resistance of the resistor R = 10V/5A = 2Ω Alternately, R = (8−2)V/(4−1)A = 6V/3A = 2 Ω	

SUBJECT:
CLASS: X
CHAPTER: Magnetic effects of current No. of PYQs:20

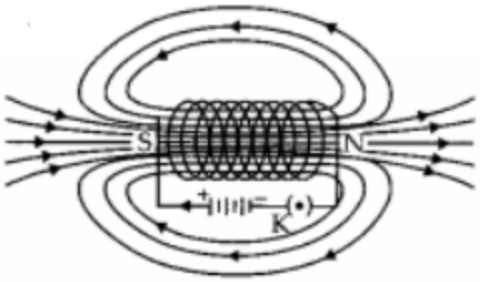
Sl No	QUESTIONS	MARK
1	Give reason for the following (i) There is either a convergence or a divergence of magnetic field lines near the ends of a current carrying straight solenoid. (ii) The current carrying solenoid when suspended freely rests along a particular direction. **(2/3, 2020)** **Solution :-** (i) There is either a convergence or a divergence of magnetic field lines near the ends of a current carrying straight solenoid because it behaves similar to that of a bar magnet and has a magnetic field line pattern similar to that of a bar magnet. Thus the ends of the straight solenoid behaves like poles of the magnet, where the converging end is the south pole and the diverging end is the north pole. (ii) The current carrying solenoid behaves similar to that of a bar magnet and when freely suspended aligns itself in the north-south direction.	
2	(a) State three factors on which the strength of magnetic field produced by a current carrying solenoid depends.**(2014,2016)** **Solution :-** (a) Strength of magnetic field produced by a current carrying solenoid depends upon the following factors: ● number of turns in the coil ● amount of current flowing through it ● radius of coil ● Material of core of the solenoid.	

3	(a) State Right Hand Thumb rule to find the direction of the magnetic field around a current carrying straight conductor. (b) How will the magnetic field be affected on: (i) increasing the current through the conductor (ii) reversing the direction of flow of current in the conductor? **(Board Term I, 2013,2015)** **Solution :-** (a) It states that you are holding a current carrying a straight conductor in your right hand such that the thumb points towards the direction of current. Then your finger will wrap around the conductor in the direction of the field lines of the magnetic field. (b) (i) If the current is increased, the magnetic field strength also increases. (ii) If the direction of current is reversed, the direction of magnetic field also get reversed.	
4	What is a solenoid? Draw a diagram to show field lines of the magnetic field through and around a current carrying solenoid. State the use of magnetic field produced inside a solenoid. **(Board Term I, 2015)** **Solution :-** Solenoid : A coil of many circular turns of insulated copper wire wrapped in the shape of cylinder is called solenoid. The pattern of magnetic field lines inside the solenoid indicates that the magnetic field is the same at all points inside the solenoid. That is, the field is uniform inside the solenoid. Solenoid is used to form strong but temporary magnet called electromagnets. These electromagnets are used in wide variety of instruments and used to lift heavy iron, objects.  Field lines of the magnetic field through and around a current-carrying solenoid	
5	State the effect of a magnetic field on the path of a moving	

	charged particle. (**Board Term I, 2014)** **Solution :-** A charged particle moving in a magnetic field may experience a force in the direction perpendicular to direction of magnetic field and direction of motion of particle. This force deflects the charged particle from its path.	
6	Write the frequency of alternating current (AC) in India. How many times per second it changes its direction? **(Board Term I, 2015)** **Solution :-**	
7	Describe an activity with labelled diagram to show that a force acts on current carrying conductor placed in a magnetic field and its direction of current through conductor. Name the rule which determines the direction of this force. **(Board Term I, 2016)** **Solution :-** A small aluminium rod suspended horizontally from a stand using two connecting wires. Place a strong horseshoe magnet in such a way that the rod lies between the two poles with the magnetic field directed upwards. For this, put the north pole of the magnet vertically below and south pole vertically above the aluminium rod.  Connect the aluminium rod in series with a battery, a key and a rheostat. Pass a current through the aluminium rod from one end to other (B to A). The rod is displaced towards left. When the direction of current flowing through the rod is reversed, the displacement of rod will be towards right. Direction of force on a	

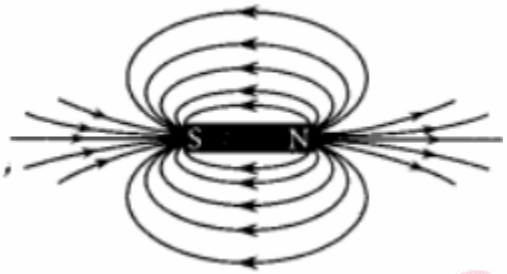
	current carrying conductor is determined by Fleming's left hand rule.	
8	(i) Alternating current has a frequency of 50 Hz. What is meant by this statement? How many times does it change its direction in one second? Give reason for your answer. (ii) Mention the frequency of D.C that is given by a cell. **(Board Term I, 2013)** **Solution :-** (i) The frequency of household supply of A.C. in India is 50 Hz. This means, A.C. completes 50 cycles in one second. Thus, A.C. changes direction 2 × 50 = 100 times in one second. (ii) Frequency of D.C. is zero as its direction does not change with time.	
9	What are magnetic field lines? List three characteristics of these lines. Describe in brief an activity to study the magnetic field lines due to a current carrying circular oil. **(Board Term I, 2017, 2016)** **Solution :-**	
10	(a) Fuse acts like a watchman in an electric circuit. Justify this statement. (b) Mention the usual current rating of the fuse wire in the line to (i) lights and fans (ii) appliance of 2 kW or more power. **(Board Term I, 2014)** **Solution :-**	
11	Give reasons for the following: (a) It is dangerous to touch the live wire of the main supply rather than neutral wire. (b) In household circuit, parallel combination of resistances is used. (c) Using fuse in a household electric circuit is important. **(Board Term I, 2017,2020)** **Solution :-** (a) Live wire is at 220V and neutral wire is at zero volt since the electric current flows from higher potential to lower potential, we can get an electric shock by touching live wire but that is not the case with neutral wire. (b) In parallel combination, each resistor gets same potential from the source. We can use separate on/off switches with each appliance. Also in case if any one resistor fails then the circuit	

	will not break. So, it is safe and convenient to connect household circuit in parallel combination of resistors (c) Fuse is an important safety device. It is used in series with any electrical appliance and protects it from short-circuiting and overloading.	
12	A compass needle is placed near a current carrying straight conductor. State your observation for the following cases and give reasons for the same in each case. (a) Magnitude of electric current is increased. (b) The compass needle is displaced away from the conductor. **(AI 2019)** **Solution :-** (a) Observation: The deflection of the needle increases. Reason: Magnetic field strength due to current-carrying wire increases as current in the wire increases, $B \propto I$. (b) Observation: The deflection in the compass needle decreases as its displacement from the current-carrying wire increases. Reason: The strength of magnetic field reduces with the increase in distance from the wire as $B \propto I/r$.	
13	Find the direction of magnetic field due to a current carrying circular coil held: (i) vertically in North – South plane and an observer looking it from east sees the current to flow in anticlockwise direction, (ii) vertically in East – West plane and an observer looking it from south sees the current to flow in anticlockwise direction, (iii) horizontally and an observer looking at it from below sees current to flow in clockwise direction .**(Board Term I, 2017)** **Solution :-** According to right hand rule, the direction of magnetic field is (i) west to east (ii) north to south (iii) into the paper.	
14	What is solenoid? Draw the pattern of magnetic field lines of (i) a current carrying solenoid and (ii) a bar magnet. List two distinguishing features between the two fields. **(Delhi 2019,2020)** **Solution :-** (i) Solenoid : A coil of many circular turns of insulated copper wire wrapped in the shape of cylinder is called solenoid.	



Field lines of the magnetic field through and around a current-carrying solenoid

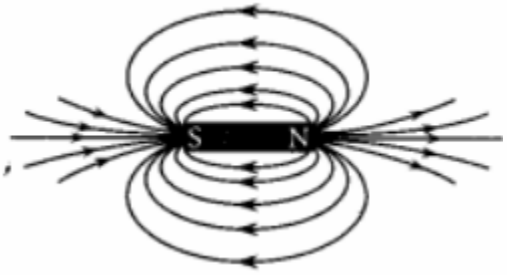
(ii) Magnetic field lines around a bar magnet.



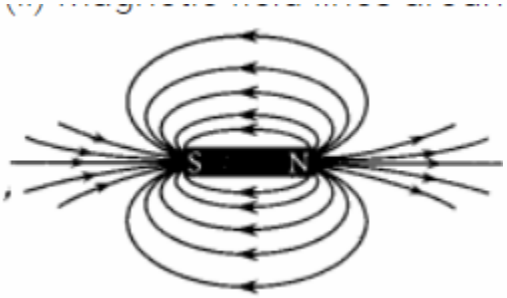
Following are the distinguishing features between the two fields.
(a) A bar magnet is a permanent magnet whereas solenoid is an electromagnet, therefore field produced by solenoid is temporary and stay till current flows through it.
(b) Magnetic field produced by solenoid is more stronger than magnetic field of a bar magnet.

15 Draw magnetic field lines around a bar magnet. Name the device which is used to draw magnetic field lines. **(Board Term I, 2015, 2017, 2016)**

Solution :-



The device which is used to draw the magnetic field lines is called a compass needle.
Magnetic field lines are drawn using a compass needle taken near a magnet, and the deflection is drawn around the magnet, representing the magnetic field lines.

16	What are magnetic field lines? Justify the following statements: (a) Two magnetic field lines never intersect each other. (b) Magnetic field are closed curves. **(Board Term I, 2013, 2015, 2016)** **Solution :-** Imaginary continuous closed curves used to represent the magnetic field in a region is known as magnetic field lines. It is directed from north pole to south pole outside the magnet and south pole to north pole inside the magnet.  (a) The direction of magnetic field (B) at any point is obtained by drawing a tangent to the magnetic field line at that point. In case, two magnetic field lines intersect each other at the point P as shown in figure, magnetic field at P will have two directions, shown by two arrows, one drawn to each magnetic field line at P, which is not possible. (b) It is taken by convention that the field lines emerges from north pole and merge at the south pole. Inside the magnet, the direction of field lines is from its south pole to its north pole. Thus, the magnetic field lines are closed curves.	
17	Name and state the rule which is used to determine the direction of force on a current carrying conductor placed in a magnetic field.**(2020,2022,2023)** **Solution :-** Fleming's left hand rule: Stretch the forefinger, middle finger and the thumb of your left hand mutually perpendicular to each other. If the forefinger indicates the direction of magnetic field and the middle finger indicates the direction of current, then the thumb will indicate the direction of motion of conductor.	
18	A current carrying conductor is placed in a magnetic field. Now answer the following. (i) List the factors on which the magnitude of force experienced by conductor depends.	

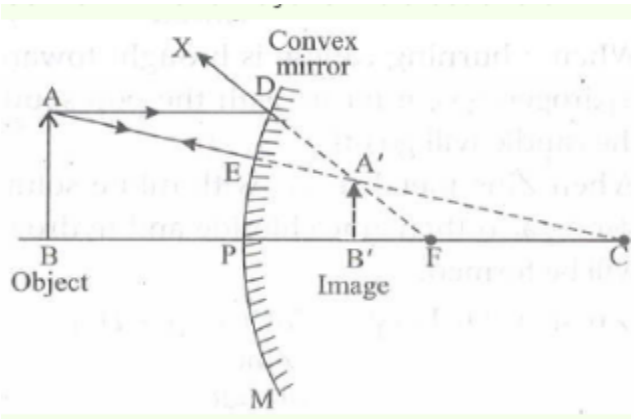
	(ii) When is the magnitude of this force maximum? (iii) State the rule which helps, in finding the direction of motion of conductor. (iv) If initially this force was acting from right to left, how will the direction of force change if: (a) direction of magnetic field is reversed? (b) direction of current is reversed? **(Board Term I, 2017)** **Solution :-** (i) When a current carrying wire is placed in a magnetic field, it experiences a magnetic force that depends on (a) current flowing in the conductor (b) strength of magnetic field (c) length of the conductor (d) angle between the element of length and the magnetic field. (ii) Force experienced by a current carrying conductor placed in a magnetic field is largest when the direction of current is perpendicular to the direction of magnetic field. (iii) The rule used in finding the direction of motion of the conductor placed in a magnetic field is Flemings left hand rule. Fleming's left hand rule is as follows: Stretch out the thumb, the forefinger, and the second (middle) finger of the left hand so that these are at right angles to each other. If the forefinger gives the direction of the magnetic field (N to S), the second (middle) finger the direction of current then the thumb gives the direction of the force acting on the conductor. (iv) (a) Direction of force will be reversed when direction of magnetic field is reversed, i.e., now force on conductor will act from left to right. (b) Direction of force will be reversed, if the direction of current is reversed, i.e., the force on the conductor will act from left to right.	
19	State whether an alpha particle will experience any force in a magnetic field if (alpha particles are positively charged particles) (i) it is placed in the field at rest. (ii) it moves in the magnetic field parallel to field lines. (iii) it moves in the magnetic field perpendicular to field lines. Justify your answer in each case. **(Board Term I, 2016,2022,2023)** **Solution :-**	

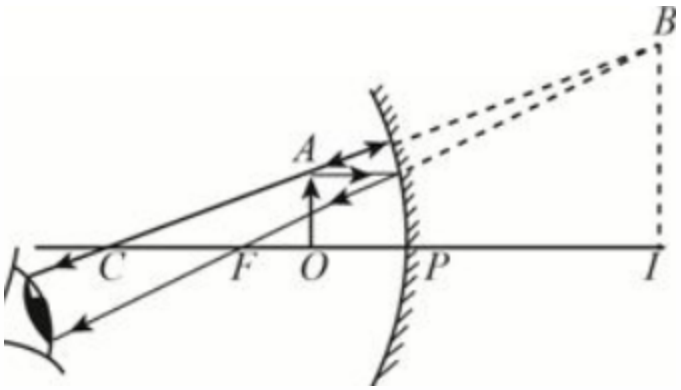
	(i) No, alpha particle will not experience any force if it is at rest, because only moving charge particle can experience force when placed in a magnetic field. (ii) No, alpha particle will not experience any force if it moves in the magnetic field parallel to field lines because charge particle experiences force only when it moves at an angle other than 0° with magnetic field. (iii) Alpha particle will experience a force in the direction perpendicular to the direction of magnetic field and direction of motion of alpha particle.	
20	Mention and explain the function of an earth wire. Why it is necessary to earth metallic appliances? (Board Term I, 2013) **(Board Term I, 2014,2016,2020)** **Solution :-** Many electric appliances of daily use like electric press, heater, toaster, refrigerator, table fan etc. have a metallic body. If the insulation of any of these appliances melts and makes contact with the metallic casing, the person touching it is likely to receive a severe electric shock. This is due to the reason that the metallic casing will be at the same potential as the applied one. Obviously, the electric current will flow through the body of the person who touches the appliance. To avoid such serious accidents, the metal casing of the electric appliance is earthed. Since the earth does not offer any resistance, the current flows to the earth through the earth wire instead of flowing through the body of the person.	

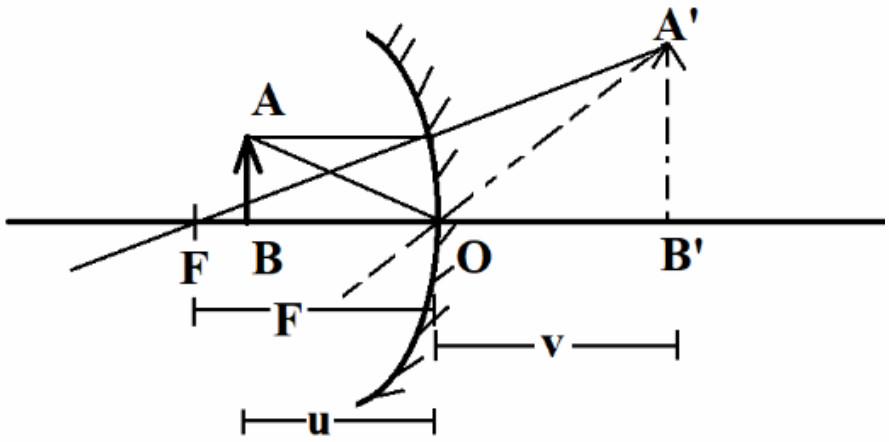
SUBJECT:
CLASS: X

CHAPTER: Light No. of PYQs:20

Sl No	QUESTIONS	MARK
1	What is the magnification of the images formed by plane mirrors and why? **(Delhi 2015)** Solution :- Magnification of images formed by plane mirrors is unity because for plane mirrors, the size of the image formed is equal to that of the object.	
2	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. **(AI2017)** Solution :- Given : Object distance, u = – 15 cm Focal length, f = + 20 cm Using lens formula, As |u| < |f| The object is placed between F and optical centre of lens. Thus, the four characteristics of the image formed by the convex lens are: (i) Erect (ii) Virtual (iii) Enlarged image, (iv) Image is formed on the same side of the lens as the object.	
3	If the image formed by a spherical mirror for all positions of the object placed in front of it is always erect and diminished , what type of mirror is it? Draw a labelled ray diagram to support your answer. **(2018)** Solution :- Convex mirror always forms erect and diminished image. In the below ray diagram, the image formed is behind the mirror between pole (P) and focus (F). The image formed is virtual, erect and diminished.	

		
4	An object is placed at a distance of 30 cm in front of a convex mirror of focal length 15 cm. Write four characteristics of the image formed by the mirror. **(Delhi 2017)** Solution :- Here, u = − 30 c m , f = 15 cm From 1/v = 1/f − 1/u = 1/15 − 1/− 30 = 3/30 = 1/10 . v= 10 cm The image is virtual, erect, smaller in size and at a distance of 10cm from the pole of the mirror at the back of the mirror.	
5	Name the type of mirrors used in the design of solar furnaces. Explain how high temperature is achieved by this device. **(AI 2016)** Solution :- Concave mirror is used in a solar furnace. The solar furnace is placed at the focus of a large concave reflector. When parallel rays of light from the sun fall on the surface of the concave mirror, rays gets reflected and meet at the focus of the mirror due to the converging nature of concave mirror. Thus, the furnace kept at the focus becomes very hot. Even steel can be melted in this furnace.	
6	The image formed by a concave mirror is observed to be virtual, erect and larger than the object. Where should the position of the object be relative to the mirror? Draw ray diagram to justify your answer. **(AI 2014)** Solution :- If the image formed by a concave mirror is virtual, erect and larger than the object, the position of the object should be between the pole of the mirror and its principal focus.	

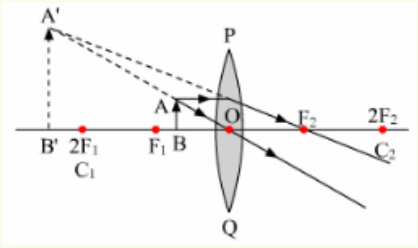
		
7	A concave mirror is used for image formation for different positions of an object. What inferences can be drawn about the following when an object is placed at a distance of 10 cm from the pole of a concave mirror of focal length 15 cm? (a) Position of the image (b) Size of the image (c) Nature of the image Draw a labelled ray diagram to justify your inferences. **(2020)** Solution :- f = -15 cm Negative sign as the mirror is a concave mirror u = -10 cm Now, for the Part A By using the image formula $1/f=1/v+1/u$ By using the given values $\Rightarrow 1/-15=1/v+1/-10$ $\Rightarrow 1/v=1/10-1/15$ $\Rightarrow 1/v=1/30$ So, v = 30 cm Now, for the Part B By using the formula for the magnification of the image We have $m=v/u$ $\Rightarrow m=30/10$ $\Rightarrow m=3$ So, the image will be highly magnified in size. Part C The image will be Virtual and Erect in nature as v is positive	



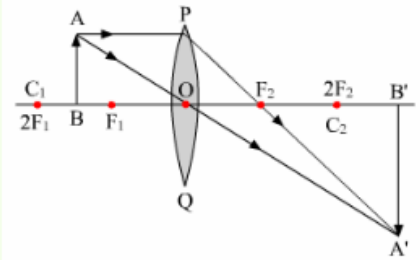
8 “A convex lens can form a magnified erect as well as magnified inverted image of an object placed in front of it”. Draw ray diagram to justify this statement stating the position of the object with respect to the lens in each case. An object of height 4 cm is placed at a distance of 20 cm from a concave lens of focal length 10 cm. Use lens formula to determine the position of the image formed. **(Delhi 2015)**

Solution :-

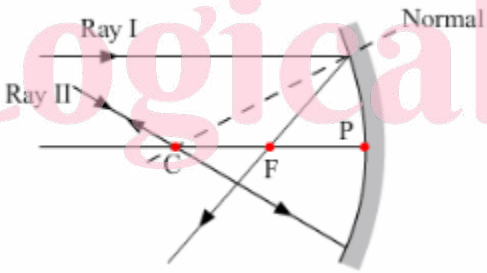
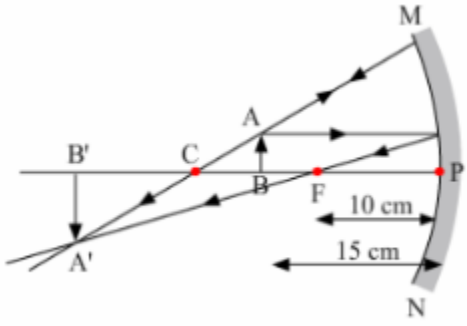
(a) Magnified erect image (When the object is placed between O and F_1)

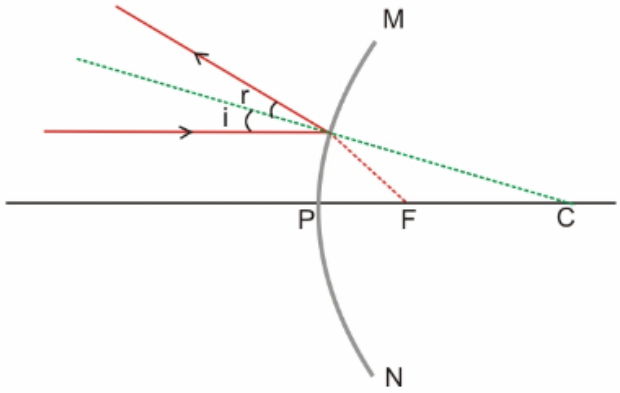


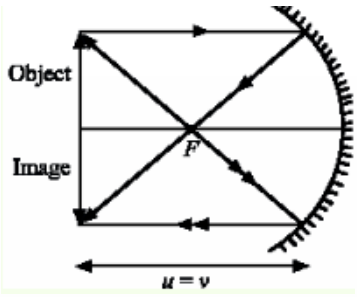
(b) Magnified inverted image (When the object is placed between F_1 and $2F_1$)



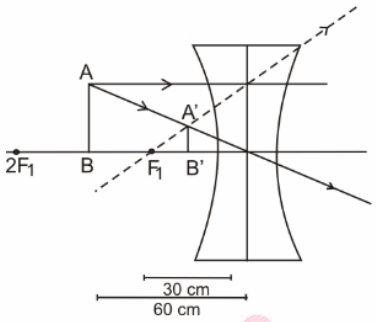
Object distance, u = 20 cm
Image distance, v =?
Focal length, f = 10 cm

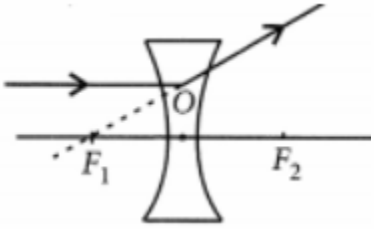
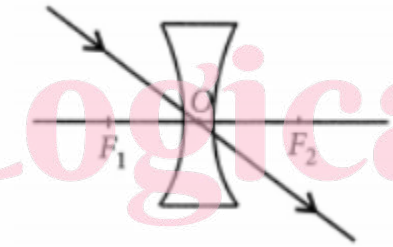
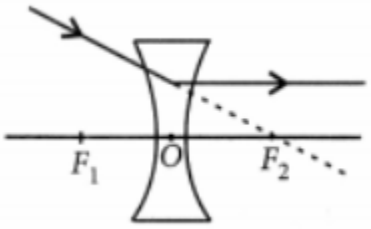
	As per the sign conventions used, f = -10 cm u = -20 cm According to the lens formula, $1/f=1/v-1/u$ $1/v=1/f+1/u$ $1/v=1/-10+1/-20=-3/20$ $\Rightarrow v=-3/20=-6.6$cm The image is formed at a distance of 6.6 cm from the lens at the same side where the object is placed.	
9	To construct a ray diagram we use two rays of light which are so chosen that it is easy to determine their directions after reflection from the mirror. Choose these two rays and state the path of these rays after reflection from a concave mirror. Use these two rays to find the nature and position of the image of an object placed at a distance of 15 cm from a concave mirror of focal length 10 cm. **(Delhi 2015, AI 2012)** Solution :-   (i) Ray I: When the incident ray is parallel to the principal axis, the reflected ray will pass through the focus of concave mirror or it appears to pass through the focus of convex mirror. (ii) Ray II: When the incident ray passes through or appears to pass through the centre of curvature, the light, after reflection from the spherical mirror, reflects back along the same path. The image formed is real, inverted and magnified. It is formed beyond the centre of curvature.	

10	Draw a labelled ray diagram to show the path of the reflected ray corresponding to an incident ray of light parallel to the principal axis of a convex mirror. Mark the angle of incidence and angle of reflection on it. **(2016,2019)** Solution :-  $\angle i = angle\ of\ incident$ $\angle r = angle\ of\ reflection$ $f = focus$ $c = centre$	
11	A spherical mirror produces an image of magnification -1 on a screen placed at a distance of 40 cm from the mirror. (i) Write type of mirror. (ii) What is the nature of the image formed? (iii) How far is the object located from the mirror? (iv) Draw the ray diagram to show the image formation in this case. **(2012, 2014)** Solution :- (a) As magnification is negative, the image formed is real. Hence, it is a concave mirror. (b) m=−v/u=−1 ∴u=v=−50cm Distance of the image from the object =|u|+|v|=100cm (c) By using mirror formula : 1/f=1/v+1/u=1/(−50)+1/(−50)=-1/25∴f=−25cm	

		
12	An object is placed perpendicular to the principal axis of a convex lens of focal length 10 cm at a distance of 20 cm from the lens. Find the position of the image. What is the magnification of the object? **(Delhi 2013)** Solution :- Here focal length of convex lens, f=10cm Distance of object, u=−20 cm Distance of image,v=? Using lens formula,1/f=1/v−1/u 1/v=1./f+1/u 1/v=1/10+1/−20 1/v=1/20⇒v=20cm Thus, the image is formed at the distance of 20 cm from the lens. Magnification =v/u=20/−20=−1	
13	Explain the term absolute refractive index of a medium' and write an expression to relate it with the speed of light in vaccum. **(2018)** Solution :- Absolute refractive index : It is the ratio of speed of light in vacuum to the speed of light in the given medium. Refractive index(n)= Speed of light in vacuum (c)/Speed of light in medium (v)	
14	What is meant by power of a lens? Write its SI unit. A student uses a lens of focal length 40 cm and another of -20 cm. Write the nature and power of each lens. **(2018)** Solution :- The power of a lens is a measure of the degree of convergence or divergence of light rays falling on it. It is also defined as the reciprocal of its focal length in metres. The S.I. unit of power is dioptre (D).	

	Let focal length of convex lens be F. Focal length of a convex lens is positive. So F_{Convex} =40cm=40/100m Power =1/Focal length=1/40/100 =100/40+2.5D So lens having focal length 40 cm is convex. Focal length of a concave lens is negative. $F_{Concave}$=−20cm=−20/100m So Power =1/Focal length=1/−20/100=−100/20=−5 D So lens having focal length -20 cm is concave.	
15	Draw a ray diagram in each of the following cases to show the formation of image, when the object is placed: (i) between optical centre and principal focus of a convex lens. (ii) anywhere in front of a concave lens. (iii) at 2F of a convex lens. State the signs and values of magnifications in the above mentioned cases (i) and (ii). **(2020)** Solution :-	
16	An object is placed at a distance of 60 cm from a concave lens of focal length 30 cm. (i) Use lens formula to find the distance of the image from the lens (ii) List four characteristics of the image (nature, position, size, erect/inverted) formed by the lens in this case (iii) Draw ray diagram to justify your answer of pair (ii) . **(2016, 2019)** Solution :- Object distance, u = − 60 cm Focal length of the lens, f = −30 cm Step 2: Finding the image distance using the lens formula: Using the lens formula, we get 1/f= 1/v - 1/u 1/v= 1/f + 1/u 1/v= 1/-30 + 1/-60 1/v= 1/-20 v= -20 cm Thus, the distance of the image from the lens is 20cm.	

	(ii) The four characteristics of the image (nature, position, size, erect/inverted) formed by the lens in this case are: 1. The image formed is virtual as the given lens is a concave lens. 2. The image is erect as it is formed above the principal axis. 3. Image is diminished (smaller than the object). 4. Image is formed at a distance of 20 cm from the optical center of the concave lens on the same side of the object.  	
17	State the two laws of reflection of light. **(2011, 2013,2014)** Solution :- Laws of reflection of light states that (i) The angle of incidence is equal to the angle of reflection. (ii) The incident ray, the reflected ray and the normal to the mirror at the point of incidence all lie in the same plane.	
18	The absolute refractive indices of glass and water are 1.5 and 1.33 respectively. In which medium does light travel faster? Calculate the ratio of speeds of light in the two media. **(Delhi 2013 ,2019,2020)** Solution :- Refractive index(RI) of glass (μ_{glass})is 1.5 and Refractive index(RI) of water(μ_{water}) is 1.33 Now, RI of glass with respect to water = $_{water}\mu g_{lass} = \mu_{glass} / \mu_{water}$ = 1.5 /1.33 = 1.127 RI of water with respect to glass = $_{glass}\mu_{water} = \mu_{water} / \mu_{glass}$ = 1.33/1.5 = 0.89 Since velocity of light in medium is inversely proportional to its refractive index, the light will travel faster in optically rarer medium i.e., water.	
19	Draw ray diagram to show the path of the refracted ray in each	

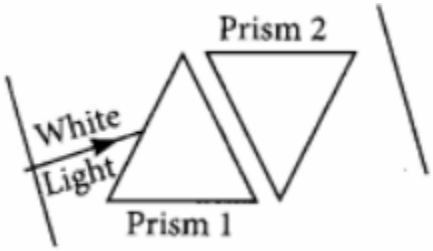
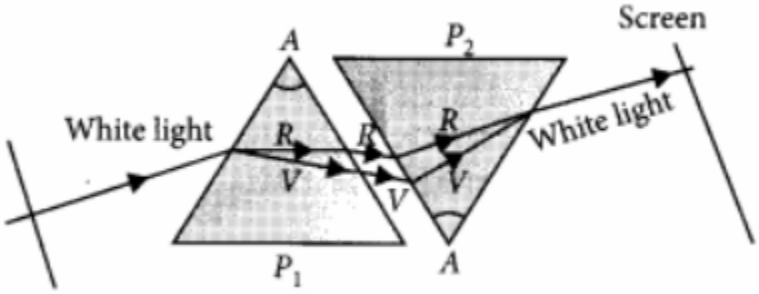
	of the following cases. A ray of light incident on a concave lens (i) is parallel to its principal axis, (ii) is passing through its optical centre and (iii) is directed towards its principal focus. **(Delhi 2013 C, 2015, 2016)** Solution :- (i) A ray of light incident on a concave lens is parallel to its principal axis, the diagram can be drawn as follows:  The refracted ray appears to pass through focus on the same side of the lens. (ii) If a ray of light incident on a concave lens is passing through its optical centre then the refracted ray will go without deviation.  (iii) If a ray of light incident on a concave lens is directed towards its principal axis then it will go parallel to principal axis.  	
20	The image of a candle flame placed at a distance of 30 cm from a mirror is formed on a screen placed in front of the mirror at a distance of 60 cm from its pole. What is the nature of the mirror? Find its focal length. If the height of the flame is 2.4 cm, find the height of its image. State whether the image formed is erect or inverted. **(2014, 2015, 2017)** Solution :- Here, u=-30,v=-60	

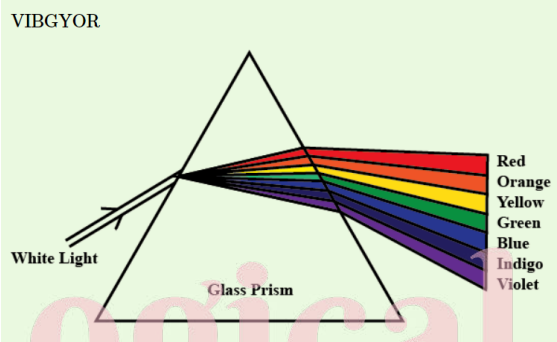
	As 1/f=1/u+1/v=1/-60+1/-30=-1/20 f=-20The mirror is concave. As the image is formed on the screen, it is real and inverted From ℏ2/ℏ1=-v/u=+60/-30=-2 ℏ2=-2*ℏ1=-2×2.4 = -4.8 cm This is the size of inverted image.	

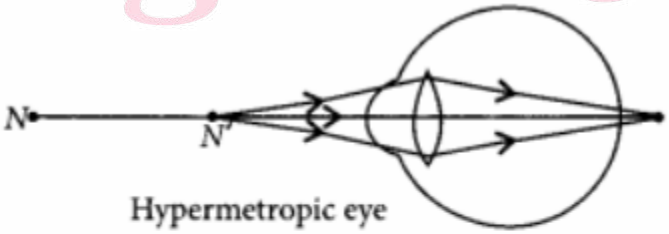
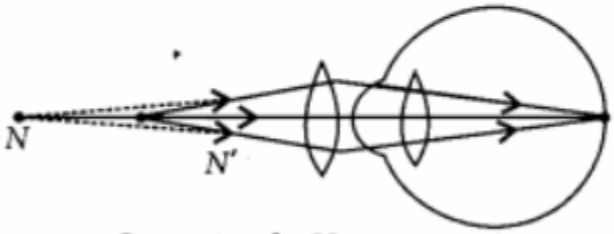
SUBJECT:
CLASS: X
CHAPTER: Human eye & colorful world No. of PYQs:20

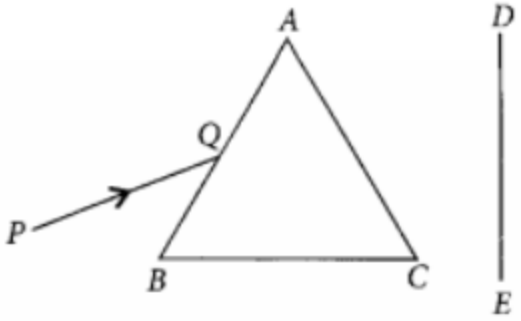
Sl No	QUESTIONS	MARK
1	(a) List the parts of the human eye that control the amount of light entering into it. Explain how they perform this function? (b) Write the function of the retina in the human eye. **(2014)** Solution:- a) The part of the human eye that controls the amount of light entering into it is pupil. Light enters the eye through a thin membrane called the cornea. It forms the transparent bulge on the front surface of the eyeball most of the refraction for the light rays entering the eye occurs at the outer surface of the cornea, the crystalline lens merely provides the linear adjustment of focal length required to focus objects at different distances on the retina. Iris which is behind the cornea controls the size of the pupil. The pupil regulates and controls the amount of light entering the eye. (b) Retina: It capture light and convert it into electric signals that are translated into images by the brain.	
2	(a) List two causes of hypermetropia. (b) Draw ray diagrams showing (i) a hypermetropic eye and (ii) its correction using a suitable optical device. **(2020)** Solution:- (a) Hypermetropia is caused due to following reasons: (i) Shortening of the eyeball (ii) Focal length of crystalline lens is too long.	
3	A student is unable to see clearly the words written on the blackboard placed at a distance of approximately 4 m from him. Name the defect of vision the boy is suffering from. Explain the method of correcting this defect. Draw ray diagram for the (i) defect of vision and also (ii) for its correction **(2015)** Solution:- Student is suffering from myopia.	

	The two possible reasons due to which the defect of vision arises are : excessive curvature of the eye lens and elongation of the eye ball. A student with myopia has the far point nearer than infinity, thus, the image of a distant object is formed in front of the retina. Correction of myopia: This defect can be corrected by using a concave lens of suitable power as it brings the image back on to the retina, thus the defect is corrected.	
4	What is meant by scattering of light? Use this phenomenon to explain why the clear sky appears blue or the sun appears reddish at sunrise. **(2015)**. Solution:- Scattering is the phenomenon by which a beam of light is redirected in many different directions when it strikes minute particles in the atmosphere. The light from the Sun has to travel a long distance of the Earth's atmosphere before reaching us. As light travels through the atmosphere, it gets scattered in different direction by the air molecules present in its path. The blue light due to its short wavelength is scattered more as compared to the red light of longer wavelength. Thus the light reaching our eye directly from sun is rich in red colour, while the light reaching our eye from all other directions is the scattered blue light. Therefore the sky in direction, other than the direction of sun, is seen blue.	
5	Explain why the planets do not twinkle but the stars twinkle. **(2011)** Solution:- The twinkling of a the star is due to atmospheric refraction. Distant stars act like a point source of light. As the beam of starlight keeps deviating from its path, the apparent position of star keeps on changing because physical conditions of earth's atmosphere are not constant. Hence, the amount of light which enters our eyes fluctuates from bright to faint. This is the "Twinkling effect of star". But planets are much closer to us than stars, so they are not point-sized objects to our eye. Hence, the fluctuations have a negligible effect and they don't seem to twinkle.	
6	(a) State the relation between color of scattered light and size of the scattering particle. (b) The apparent position of an object, when seen through the	

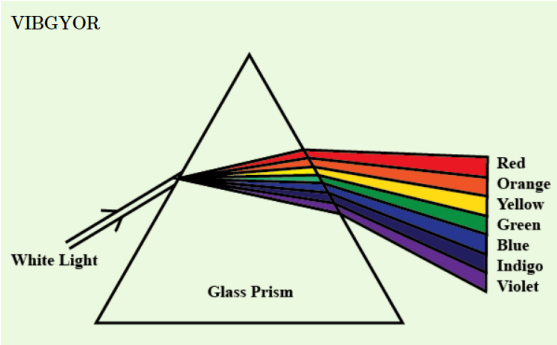
	hot air, fluctuates or waves. State the basic cause of this observation. (c) Complete the path of white light when it passes through two identical prisms placed as shown **(2013)**  Solution:- (a) The colour of scattered light depends on the size of the scattering particle. Very fine particles scatter short wavelengths such as blue and violet, lights. Large size particles scatter light of longer wavelengths. (b) The basic cause of this observation is atmospheric refraction. As hot air is less denser then the colder air surrounding it, it has a slightly lower refractive index. Since the physical condition of the refracting medium, in air is not stationary, the apparent position of an object, when seen through hot air fluctuates. (c)  	
7	Explain why danger signals are painted red in color ? (2015,2017, 2020) Solution:- Since the wavelength of light is maximum in the spectrum, its penetration power in the air is maximum and so we can see red colour from farther distances. Thus, danger signal uses red colour.	
8	Define the term power of accommodation. Write the modification in the curvature of the eye lens which enables us to	

	see the nearby objects clearly? **(2017,2019)** Solution:- The ability of eye lens to adjust its focal length is called as accommodation of eye. While viewing nearby objects, ciliary muscles contract resulting in the thickening of lens. It gets compressed into a more convex shape decreasing the focal length. The image falls on retina enabling to see the nearby objects clearly	
9	Draw a labeled ray diagram to illustrate the dispersion of a narrow beam of white light when it passes through a glass prism. **(2012)** Solution:-  	
10	(a) A person is suffering from both myopia and hypermetropia. (i) What kind of lenses can correct this defect? (ii) How are these lenses prepared? (b) A person needs a lens of power +3 D for correcting his near vision and -3D for correcting his distant vision. Calculate the focal lengths of the lenses required to correct these defects. **(2020)** Solution:- (a) (i) The lens which can correct the vision of such a person suffering from both myopia and hypermetropia is a bifocal lens. (ii) A common type of bifocal lens contains both concave and convex lens. It is prepared with the upper portion consisting of a concave lens facilitating distant vision and the lower portion consisting of convex lens facilitating near vision, (b) The power for correcting his near vision, P_N = +3 D. As P = 1/f(m) ∴ Focal length of convex lens needed, $f_N = 1/P_N$ = 0.33 m = +33.33 cm Power required to correct distant vision, P_D = -3D ∴ Focal length of concave lens,	

	$f_D = 1/P_D = -0.33$ m $= -33.33$ cm.	
11	(a) A person cannot read a newspaper placed nearer than 50 cm from his eyes. Name the defect of vision he is suffering from. Draw a ray diagram to illustrate this defect. List its two possible causes. Draw a ray diagram to show how this defect may be corrected using a lens of appropriate focal length. (b) We see advertisements for eye donation on television or in newspapers. Write the importance of such advertisements. **(Delhi 2013)** Solution:- (a) The person is suffering from hyperme-tropia. Hypermetropia : It is a defect in an eye in which a person is not able to see nearby object distinctly but can see far objects clearly. Refer to answer 11. (b) It is important to advertise for eye donation on television or in newspaper because (i) Few people are unaware about the fact that there can be an eye transplant through which blind people can see this colourful and beautiful world. (ii) To encourage them to donate their eye by spreading awareness about it through television or newspaper.  Hypermetropic eye  Correction for Hypermetropic eye	
12	A narrow PQ of white light is passing through a glass prism ABC as shown in the diagram. Trace it on your answer sheet and show the path of the emergent beam as observed on the screen DE.	

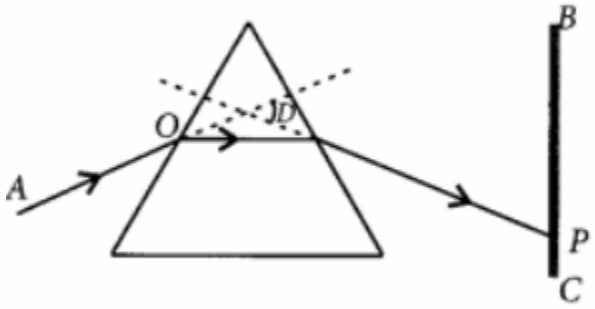


(i) Write the name and cause of the phenomenon observed.
(ii) Where else in nature is this phenomenon observed?
(iii) Based on this observation, state the conclusion which can be drawn about the constituents of white light. **(2014)**
Solution:-
(i) The phenomenon of the splitting up of the white light into its constituents colours is called dispersion of light. Dispersion of light is caused due to, different constituents colours of light after different refractive indices to the material of the prism.
(ii) The formation of rainbow is caused by the dispersion of the white sunlight into its constituent colours.
(iii) Based on the dispersion of white light into its constituents colours, we can conclude that
(a) The white light consists of seven colours.
(b) The violet light Millers maximum deviations and the red light suffers minimum deviation.

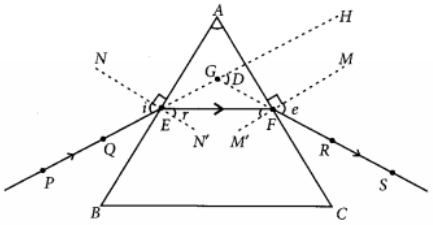
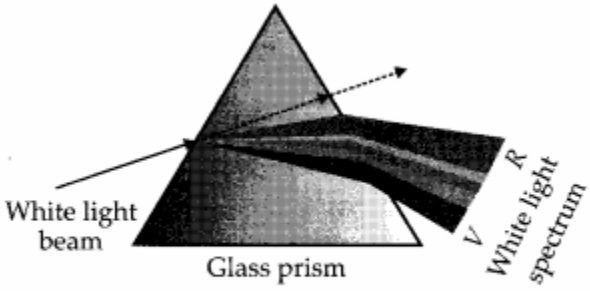


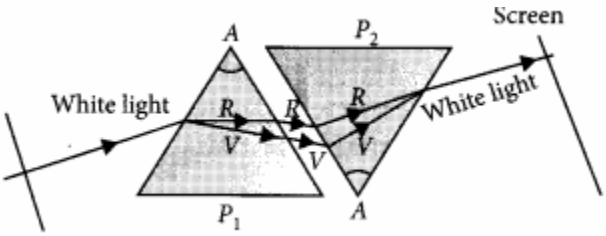
13

Give reasons:
(i) The extent of deviation of a ray of light on passing through a prism depends on the color.
(ii) Lights of red color are used for danger signals. **(2011, 2022)**
Solution:-
(i) Refractive index of a medium is different for different colours of light. (ii) Due to large wavelength, red colour is least scattered and travel to large distance.

14	(a) With the help of labeled ray diagrams show the path followed by a narrow beam of monochromatic light when it passes through a glass prism. (b) What would happen if this beam was replaced by a narrow beam of white light? **(2020)** Solution:-  Here, in the figure, ∠D is the angle of deviation of the given monochromatic light by the glass prism. (b) If AO were a ray of white light, then on screen BC, a spectrum will be observed, consisting of seven colours arranged from bottom to top as follows. Violet, Indigo, Blue, Green, Yellow, Orange, Red (VIBGYOR)	
15	A student is unable to see clearly the words written on the black board placed at a distance of approximately 3 m from him. Name the defect of vision the boy is suffering from. State the possible causes of this defect and explain the method of correcting it. **(2017, 2018)** Solution:- Student is suffering from myopia. The two possible reasons due to which the defect of vision arises are : excessive curvature of the eye lens and elongation of the eye ball. A student with myopia has the far point nearer than infinity, thus, the image of a distant object is formed in front of the retina. Correction of myopia: This defect can be corrected by using a concave lens of suitable power as it brings the image back on to the retina, thus the defect is corrected.	
16	Differentiate between a glass slab and a glass prism. What happens when a narrow beam of (i) a monochromatic light and (ii) white light passes through (a) glass slab and (b) glass prism? **(2020)** Solution:-	

	Glass slab: It is a substance made of glass having three dimension and has cuboidal structure. It does not deviate the path of light falling on it but produces a lateral displacement of the light ray after refraction. The incident and emergent ray are parallel to each other. Glass prism: A prism is a structure made of glass with two triangle bases and three rectangular lateral surfaces. These surfaces are inclined to each other. A prism deviates the path of light ray falling on it. Here the incident ray and emergent ray are not parallel to each other. (i) When a narrow beam of monochromatic light falls on a (a) glass slab, it gets refracted at its surface and the emergent ray is laterally displaced from the incident ray. (b) prism, it gets refracted at the surface and the light gets deviated from its initial path. The angle between the incident ray and emergent ray is known as angle of deviation. (ii) When a white light passes through a (a) glass slab, the light does not undergo dispersion as its two refracting surfaces are parallel to each other. The white light is laterally displaced from its initial path. (b) prism, the white light undergoes dispersion and splits into its constituent colours along with deviation from its initial path.	
17	State the function of each of the following parts of human eye: (i) Cornea (ii) Iris (iii) Pupil **(2013,2016,2018)** Solution:- (i) Cornea : It is a transparenl bulge on the front surface of eyeball which refracls most ol lhe light rays entering the eye. (ii) Iris : Refer to answer 1. (iii) Pupil: It controls the amount of light entering into the eye.	
18	Draw a ray diagram to show the refraction of light through a glass prism. Mark on it (a) the incident ray, (b) the emergent ray and (c) the angle of deviation. **(2011, 2013,2017)** Solution:-	

	 i = angle of incidence (a) PE = incident ray (b) FS = emergent ray (c) ∠D = angle of deviation	
19	What is 'dispersion of white light'? State its cause. Draw a ray diagram to show the dispersion of white light by a glass prism. **(2011, 2013, 2016,2017)** Solution:- Splitting of white light into its seven constituent colours due to refraction is known as dispersion of white light. Cause of dispersion : When a beam of white light enters a prism, it gets refracted and splits into seven constituent colours. The splitting of the light ray occurs due to the different bending angle for each colour. Thus, each colour ray when passing through the prism bends at different angles with respect to the incident beam, thus giving rise to a spectrum.  Dispersion of white light by the glass prism	
20	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. **(2016,2017,2019, 2020)** Solution:- Newton was the first to use a glass prism to obtain the spectrum of a white light. He then placed a second identical prism in an	

	inverted position with respect to the first prism. This allowed all the colours of the white light to pass through the second prism combining to form a white light emerging from the other side of the second prism. This made him believe that white light was composed of different colours.  	

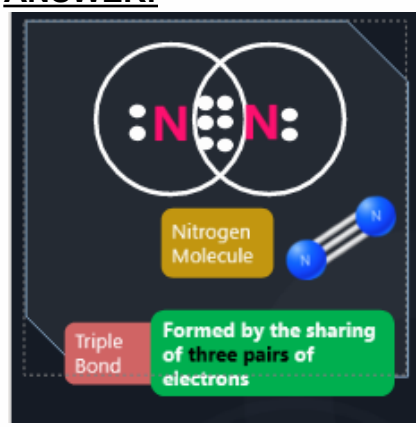
SUBJECT: Chemistry
CLASS: X

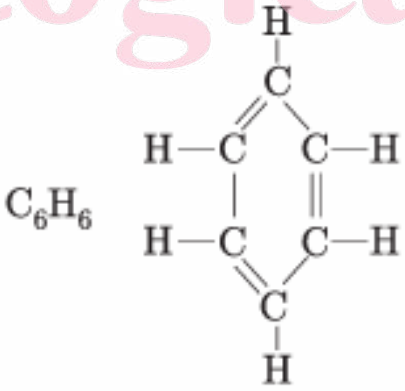
CHAPTER: Carbon and Its compounds
No. of PYQs:20

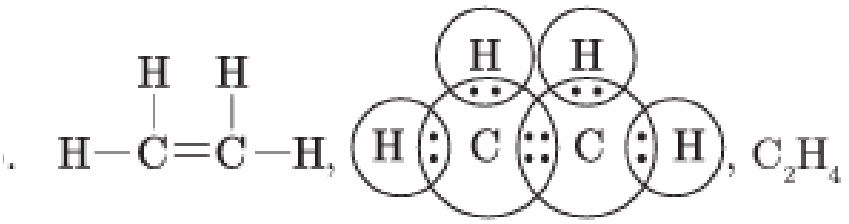
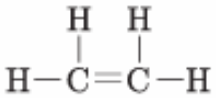
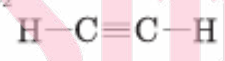
Sl No	QUESTIONS	MARK
1	Why are detergents preferred over soaps for washing clothes in hard water? Explain. **[CBSE 2015,2014]** **ANSWER:** Detergents work well even with hard water because their calcium and magnesium salts are soluble in water. They do not form scum.	
2	Why is hydrogenation? What is its industrial application? **[CBSE 2015,2014]** **ANSWER:** Hydrogenation is a process of adding hydrogen to unsaturated compounds in presence of catalyst like nickel to form saturated hydrocarbons. Industrially, it is used to convert vegetable oils to vegetable ghee.	
3	Why do covalent compounds have low melting and boiling points? **[CBSE 2020,2021]** **ANSWER:** The molecules of covalent compounds are held by weak intramolecular forces. Thus, a very small amount of energy is required to break the bonds between two or more molecules. That is why they have low melting and boiling points.	
4	Explain the reasons why carbon can neither form C^{4+} cation nor C^{4-} anion but forms covalent compounds which are bad conductors of electricity and have low melting and boiling points. **[CBSE 2017,2021]** **ANSWER:** Carbon cannot lose four electrons because high energy is needed to remove four electrons. It cannot gain 4 electrons because 6 protons cannot hold 10 electrons. It can share 4 electrons to form covalent bonds. Covalent	

	compounds do not conduct electricity because these do not form ions. They have low melting and boiling points due to weak force of attraction between molecules.	
5	List in tabular form how covalent compounds differ from ionic compounds. **[CBSE 2016,2017]** **ANSWER:** **Covalent compounds** vs **Ionic compounds** 1. They have weak intermolecular forces of attraction. / They have strong intermolecular forces of attraction. 2. They have low melting and boiling points. / They have high melting and boiling points. 3. They do not conduct electricity. / They conduct electricity in molten state or in aqueous solution.	
6	List four characteristics of homologous series. **[CBSE 2019,2014]** **ANSWER:** a. All members are derived from the same general formula. b. All members have the same functional group. c. Each successive member differs by —CH2 unit. d. All members can be prepared by the same methods of preparation.	
7	A compound X on heating with excess of cone. H_2SO_4 at 443 K gives an unsaturated compound Y. X also reacts with sodium metal to evolve a colorless gas Z. Identify X, Y and Z. Write the equations of the chemical reaction of formation of Y and also write the role of conc. sulphuric acid in the reaction. **[CBSE 2016,2018]** **ANSWER:**	

	$CH_3CH_2OH \xrightarrow[443\ K]{conc.\ H_2SO_4} CH_2=CH_2 + H_2O$ (X) (Y) Here, cone H_2SO_4 acts as a dehydrating agent i.e., helps in the removal of water. $2CH_3CH_2OH + 2Na \longrightarrow 2CH_3CH_2ONa + H_2\uparrow$ (X) Colourless gas (Z)	
8	What happens when ethyl alcohol and acetic acid react with each other in the presence of cone. H_2SO_4? [**CBSE 2015,2013,]** **ANSWER:** Pleasant fruity smelling compound ester is formed. $CH_3\overset{2}{C}OOH + C_2H_5\overset{4}{O}H \xrightarrow[\Delta]{Con.\ H_2SO_4} CH_3COOC_2H_5 + H_2O$	
9	Select alkenes and alkynes from the following: C_2H_4 , C_3H_4 , C_2H_2 , C_4H_8. **[CBSE2015,2014]** **ANSWER:** Alkenes C_2H_4 , C_4H_8 Alkynes C_3H_4 , C_2H_2	
10	Write the number of covalent bonds in the molecule of ethane **[CBSE 2015,2016]** **ANSWER:** 7 Covalent Bond	
11	What will you observe on adding a 5% alkaline $KMnO_4$ solution drop by drop to some warm ethanol taken in a test tube? Write the name of the compound formed during the above chemical reaction.. **[CBSE 2013,2020]** **ANSWER:** The purple color of $KMnO_4$ decolourises and ethanoic acid will be formed $CH_3-CH_2-OH \xrightarrow[KMnO_4]{Alkaline} CH_3COOH$ Ethanol Acetic acid	

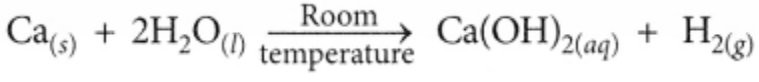
12	Draw the electron dot structure of Nitrogen **CBSE 2023,2021]** **ANSWER:**  	
13	Give reason for the formation of scum when soaps are used with hard water. **[CBSE 2016, CBSE 2013]** **ANSWER:** Soaps are sodium or potassium salts of long chain carboxylic acids e.g. sodium stearate. They react with Ca^{2+} and Mg^{2+} ions in hard water to form an insoluble residue called scum.	
14	Write the chemical equation to show what happen when methane is treated with chlorine in the presence of sunlight ? **[CBSE 2015,2014,]** **ANSWER:** $CH_4 + Cl_2 \xrightarrow{\text{Sunlight}} \underset{\text{Chloromethane}}{CH_3Cl} + HCl$ $CH_3Cl + Cl_2 \xrightarrow{\text{Sunlight}} \underset{\text{Dichloromethane}}{CH_2Cl_2} + HCl$ $CH_2Cl_2 + Cl_2 \xrightarrow{\text{Sunlight}} \underset{\text{Trichloromethane}}{CHCl_3} + HCl$ $CHCl_3 + Cl_2 \xrightarrow{\text{Sunlight}} \underset{\text{Tetrachloromethane}}{CCl_4} + HCl$	

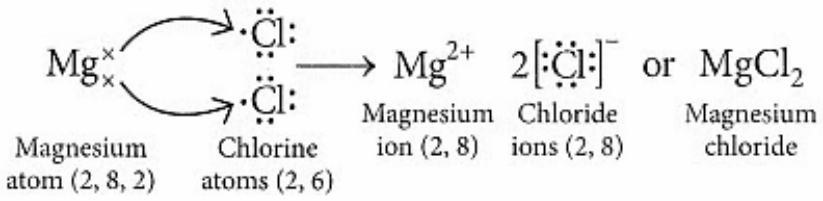
15	Complete the following chemical equations : (i) $CH_3COOC_2H_5$ + NaOH → (ii) CH_3COOH + NaOH → **[CBSE 2017,2013]** **ANSWER:**	
16.	Write one chemical equation to represent each of the following types of reactions of organic substances: (i) Esterification (ii) Saponification **[CBSE 2017,2023]** **ANSWER:**	
17	What happens when ethanol is burnt in air? **[CBSE 2015,2017]** **ANSWER:**	
18	Write the molecular formula of benzene and draw its structure. **[CBSE 2017,2021,2023]** **ANSWER:** Ans :  C_6H_6 Benzene	
19	Write the molecular formula of ethene and draw its electron dot structure: Ethene. **[CBSE 2015,2021,2109]** **Answer:**	

		
20	What is meant by a homologous series of carbon compounds? Write the general formula of (i) alkenes, and (ii) alkynes. **[CBSE 2015,2014,2016,2019]** **ANSWER:** The series of organic compounds having the same functional group and similar chemical properties is called the i. Alkenes C_nH_{2n}  Ethene ii. Alkynes C_nH_{2n-2}  Ethyne homologous series.	

SUBJECT: Chemistry
CLASS: X

CHAPTER: Metals and NON METALS
No. of PYQs:20

Sl No	QUESTIONS	MARK
1	Give reason why: Electric wires are coated with plastic. [CBSE 2015, 2014]	1
Answer	Plastic is a non-conductor of electricity, therefore electric wires are coated with plastic.	
2	Give reasons for the following: a. Platinum, gold and silver are used for making jewelry. b. Sodium, potassium and lithium are stored under kerosene oil. c. Aluminum is highly reactive metal but still used for making cooking utensils. d. Carbonate and sulfide ores are usually converted into oxides during the process of extraction. [CBSE 2013, 2014]	2
Answer	a. It is because they are low reactive and lustrous metals. b. These are highly reactive metals. c. It forms an oxide layer on its surface which makes it passive. d. It is easier to reduce a metal oxide than sulphides and carbonates	
3	Why does calcium start floating when it reacts with water? Write the balanced chemical equation of the reaction [CBSE 2015,2013]	2
Answer	Calcium reacts with cold water to form calcium hydroxide and hydrogen gas. The bubbles of hydrogen gas produced stick to the surface of calcium and hence, it starts floating on the surface of water. 	

4	Show the electronic transfer in formation of $MgCl_2$ from its elements. [CBSE 2016,2020]	2
Answer		
5	Write one example of each of a. a metal which is so soft, that it can be cut with a knife b. a metal which exists as liquid at room temperature. [CBSE 2015,2020]	1
Answer	a.Sodium is so soft that it can be easily cut with a knife. b.Mercury is a metal which is found in liquid state at room temperature.	
6	Why do silver articles turn black after some time? [CBSE 2013,2019]	1
Answer	Silver turns black due to the formation of Ag_2S, (Silver sulfide).	
7	How mercury is extracted from its ore? [CBSE 2013,2020]	2
Answer	$2HgS(s) + 3O_2(g) \xrightarrow{Heat} 2HgO(s) + 2SO_2(g)$ $2HgO(s) \xrightarrow{Heat} 2Hg(l) + O_2(g)$	
8	How is copper obtained from Cu_2S? Give reactions.[CBSE 2015,2013,]	2
Answer	a. Roasting: $Cu_2S(s) + 3O_2(g) \longrightarrow 2Cu_2O(s) + SO_2(g)$ b. Self-Reduction: $Cu_2S(s) + 2Cu_2O(s) \xrightarrow{Heat} 6Cu(s) + SO_2(g)$ Then Electrolytic refining of copper is used to purify the metal.	
9	Aluminum oxide and zinc oxide react with both acids and bases to produce salt and water. What are these oxides called? Write	2

	chemical equations in each case. [CBSE 2016,2015]	
Answer	These are called amphoteric oxides: $Al_2O_3 + 2NaOH \longrightarrow 2NaAlO_2 + H_2O$ $ZnO + 2NaOH \longrightarrow Na_2ZnO_2 + H_2O$ $ZnO + 2HCl \longrightarrow ZnCl_2 + H_2O$ $Al_2O_3 + 6HCl \longrightarrow 2AlCl_3 + 3H_2O$	
10	Copper coin is kept immersed in silver nitrate solution for sometime. What change will take place in the coin and in the color of the solution? Write a balanced chemical equation for the reaction. [CBSE 2015,2014]	2
Answer	The solution will become blue in color, silver metal will get deposited: $Cu(s) + 2AgNO_3(aq) \longrightarrow Cu(NO_3)_2(aq) + 2Ag(s)$	2
11	How can we prevent corrosion of iron? [CBSE 2016,2017]	2
Answer	We can prevent corrosion of iron by 1. Painting, 2. Oiling and greasing, 3. Galvanisation, 4. By forming its alloys.	
12	Hydrogen gas is not evolved when most of the metals react with nitric acid. [CBSE 2016,2013]	2
Answer	Nitric acid is an oxidizing agent, therefore H_2 (g) is not evolved on reaction with metal. Dilute HNO_3 mostly gets reduced to NO in this process.	
13	List three properties of compounds formed by ion formations.[CBSE 2016, 2014]	2
Answer	a.The compound will have high melting and boiling point. b. It will be soluble in water. c. It will conduct electricity in molten state as well as in aqueous solution.	
14	The reaction of metal X with Fe_2O_3 is highly exothermic and is used to join railway tracks. Identify metal X. Write the chemical	2

	equation for the reaction. [CBSE 2016,2023,]	
Answer	X is Al. $2Al + Fe_2O_3 \longrightarrow Al_2O_3 + 2Fe$	
15	Zinc is a metal found in the middle of the activity series of metals. In nature, it is found as a carbonate ore, $ZnCO_3$. Mention the steps carried out for its extraction from the ore [CBSE 2023,2013]	3
Answer	Conversion of the carbonate ore into metal oxide : This is done by calcination (for carbonate ores). Calcination is the process of heating the ore strongly in the absence or limited supply of air. The zinc carbonate on heating decomposes to form zinc oxide as shown : (b) Reduction of the metal oxide to metal : As zinc is moderately reactive, zinc oxide cannot be reduced by heating alone. Hence, it is reduced to zinc by using a reducing agent such as carbon. $\underset{\substack{\text{Zinc carbonate}\\(\text{Calamine-ore of Zn})}}{ZnCO_{3(s)}} \xrightarrow[(\text{Absence of air})]{\text{Heat}} ZnO_{(s)} + CO_{2(g)}$ $\underset{\text{Zinc oxide}}{ZnO_{(s)}} + \underset{\text{Coke}}{C_{(s)}} \xrightarrow{\text{Heat}} \underset{\text{Zinc}}{Zn_{(s)}} + \underset{\text{Carbon monoxide}}{CO_{(g)}}$	
16	Why do ionic compounds conduct electricity in molten state and not in solid state?[CBSE 2014,2023]	2
Answer	Ionic compounds do not conduct electricity in solid state because ions are not free to move. In molten state, ions are free to move.	
17	List in tabular form three chemical properties on the basis of which we can differentiate between a metal and a nonmetal [CBSE 2014,2017]	3

<table>
<tr><td></td><td>
<table>
<tr><th></th><th>Metal</th><th>Non-metals</th></tr>
<tr><td>1.</td><td>Metallic oxides are basic in nature.</td><td>Non-metallic oxides are acidic in nature</td></tr>
<tr><td>2.</td><td>Most of metals liberate H_2 gas with dilute acids.</td><td>Non-metals do not liberate H_2 gas with dilute acids.</td></tr>
<tr><td>3.</td><td>Metal hydroxides, bases turn red litmus blue.</td><td>Non metallic oxides form acid in aqueous solution, which turns blue litmus red.</td></tr>
</table>
</td><td></td></tr>
<tr><td>18</td><td>Differentiate between roasting and calcination giving chemical equations for each. [CBSE 2013,2023]</td><td>2</td></tr>
<tr><td></td><td>
<table>
<tr><th></th><th>Roasting</th><th>Calcination</th></tr>
<tr><td>1.</td><td>It is done in the presence of oxygen.</td><td>It is done in the absence of oxygen.</td></tr>
<tr><td>2.</td><td>It is done with sulphide ores eg.
$2ZnS + 3O_2 \longrightarrow 2ZnO + 2SO_2$</td><td>It is done with carbonate ores e.g.
$FeCO_3 \xrightarrow{\text{Heat}} FeO(s) + CO_2(g)$</td></tr>
</table>
</td><td></td></tr>
<tr><td>19</td><td>An alloy has a low melting point and is therefore used for electrical fuse. Name the alloy and write its constituents [CBSE 2014] OR Why is solder used for making electrical fuse? [CBSE 2020]</td><td>1</td></tr>
<tr><td>Answer</td><td>Solder is an alloy which is made up lead and tin.
Solder has a low melting point so it is used for welding electrical wires.</td><td></td></tr>
<tr><td>20</td><td>Why are copper vessels corroded with a green coating in the rainy season? [CBSE 2015,2016,2019]</td><td>2</td></tr>
<tr><td>Answer</td><td>It is due to the formation of basic copper carbonate, $CuCO_3.Cu(OH)_2$.</td><td></td></tr>
</table>

SUBJECT:
CLASS: X

CHAPTER: chemical reaction & equation No. of PYQs:20

Sl No	QUESTIONS	MARK
1	What can be seen when a strip of copper metal is placed in a solution of silver nitrate?[CBSE 2014, 2015]	
2	List two observations that are noticed when an iron nail is put inside copper sulfate solution. Write the chemical equation for the reaction that occurs.[CBSE 2016,2015]	
3	Translate the following statement into a chemical equation and then balance it. “A metal in the form of ribbon burns with a dazzling white flame and changes into white powder.”[CBSE 2013,2015]	
4	Write chemical equations for the reactions taking place when a. Iron reacts with steam b. Magnesium reacts with dil. HCl c. Copper is heated in air [CBSE 2014, 2015]	
5	Name two salts that are used in black and white photography. Give equations for the reactions when these are exposed to sunlight. [CBSE 2016,2018]	
6	Write a balanced chemical equation for the process of photosynthesis and the conditions of reaction giving the physical state of all substances.[CBSE 2014, 2015]	
7	What happens when an aqueous solution of sodium sulfate reacts with an aqueous solution of barium chloride? State the physical conditions of reactants in which the reaction between them will not take place. Write the balanced chemical equation for the reaction and name the type of reaction. [CBSE 2016, 2018]	
8	On heating copper powder in air, the surface of copper powder becomes coated with black CuO. How can this black coating be converted into brown copper? Write chemical equation for the reaction that occurs during the color change [CBSE 2015,2020]	

9	Why should an equation be balanced? [CBSE 2015,2021]	
10	A shining metal 'M' on burning gives a dazzling white flame & changes to a white powder 'N'. A. Identify 'M' & 'N'. B. Represent the above reaction in the form of a balanced chemical equation . C. Does 'M' undergo oxidation or reduction in this reaction [CBSE 2020, 2022]	
11	What is a double displacement reaction? Explain with an example.[CBSE 2019, 2023]	
12	What is observed when a solution of potassium iodide is added to a solution of lead nitrate? Name the type of reaction. Write a balanced chemical equation to represent the above chemical reaction. [CBSE 2014, 2013]	
13	Name the reducing agent in the following reaction: $3MnO_2 + 4Al \rightarrow 3Mn + Al_2O_3$ State which is more reactive, Mn or Al and Why? [CBSE 2016, 2015]	
14	Write the chemical equation of the reaction in which the following changes take place with an example of each. a. Change in color, b. Change in tem-perature: [CBSE 2023,2015]	
15	Solid calcium oxide was taken in a container and water was added slowly to it. (a) Write the observations. (b) Write the chemical formula of the product formed. [CBSE 2013, 2019]	
16	Decomposition reactions require energy either in the form of heat, light or electricity for breaking down the reactants. Write an equation each for decomposition reactions where energy is supplied in the form of heat, light and electricity. [CBSE 2018, 2014]	
17	In the electrolysis of water, A. Name the gasses liberated at anode & cathode. B. Why is it that the volume of gas collected on one electrode is two times that on the other electrode? C. What would happen if dilute H_2SO_4 is not added to water? [CBSE 2020, 2013,CBSE Sample Paper 2018]	
18	Write a balanced chemical equation for the following reactions: (i) Phosphorus burns in the presence of chlorine to form phosphorus pentachloride. (ii) Burning of natural gas. (iii) The	

	process of respiration [CBSE 2015,2022]	
19	What change in color is observed when white silver chloride is left exposed to sunlight? State the type of chemical reaction in this change.[CBSE 2014, 2019,2023]	
20	A student wants to study a decomposition reaction by taking ferrous sulfate crystals. Write two observations while performing the experiment. [CBSE 2016,2017,2019]	

SUBJECT:
CLASS: X

CHAPTER: Acids Bases and salts
No. of PYQs:20

Sl No	QUESTIONS	MARK
1	A white chemical compound becomes hard on mixing the proper quantity of water. It is also used to maintain joints in a fixed position. Name the chemical compound and write its chemical formula. Write the chemical equation to show what happens when water is added to this compound in proper quantity. **[CBSE Sample Paper 2018, CBSE 2016]**	
Answer	The name of the chemical compound is Plaster of Paris ($CaSO_4 \frac{1}{2} H_2O$) $CaSO_4.\frac{1}{2}H_2O + 1\frac{1}{2}H_2O \longrightarrow CaSO_4.2H_2O$ (Plaster of Paris) (Gypsum)	
2	2 mL of sodium hydroxide solution is added to a few pieces of granulated zinc metal taken in a test tube. When the contents are warmed, a gas evolves which is bubbled through a soap solution before testing. Write the equation for the chemical reaction involved and the test to detect the gas. Name the gas which will be evolved when the same metal reacts with a dilute solution of a strong acid. .**[CBSE 2016,2018]**	

Answer	When zinc is added in sodium solution sodium zincate (Na_2ZnO_2) is formed along with hydrogen gas. $2NaOH + Zn \rightarrow Na_2ZnO_2 + H_2$ When burning splint is held near the evolved it continues burning with pop sound indicating evolution of Hydrogen gas. Same metal i.e Zn reacts with strong acid H_2SO_4 to give $ZnSO_4$ $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2 \uparrow$	
3	The pH of soil 'A' is 7.5, while that of soil "B is 4.5. Which of the two soils A or B should be treated with powdered chalk to adjust the pH and why? **[CBSE 2016,2015]**	
Answer	Because the pH of Soil B is less than 7, it is acidic. As a result, soil B should be treated with powdered chalk to reduce acidity and allow plants to thrive.	
4	On diluting an acid, it is advised to add acid to water and not water to acid. Explain why it is so advised? **[CBSE 2014, 2015]**	
Answer	The process of adding water to an acid is highly exothermic, therefore it is always recommended that acid should be added to water. If it is done the other way, then it might be possible that because of the large amount of heat generated, the mixture may splash out and cause burns	
5	Write the chemical formula of washing soda. How can it be obtained from baking soda ? List two industries in which washing soda is used for other purposes than washing clothes. **[CBSE 2015,2019]**	
Answer	The chemical formula of washing soda is $Na_2CO_3.10H_2O$ Washing soda can be obtained by heating baking soda. On heating, baking soda gives sodium carbonate, carbon dioxide and water. Washing soda is used in glass, soap and paper industries. $Na_2CO_3 + 10H_2O \rightarrow Na_2CO_3.10H_2O$ (Sodium carbonate)	

6	(a) Three acidic solutions A, B and C have pH = 0, 3 and 5 respectively. (i) Which solution has the highest concentration of H^+ ions? (ii) Which solution has the lowest concentration of H^+ ions? **[CBSE 2014, 2016]**	
Answer	(a) (i) The solution having lower pH will have more hydrogen ion concentration. Hence, solution 'A' will have highest H^+ ion concentration. (ii) Solution 'C' i.e., pH = 5 has the lowest concentration of H^+ ions.	
7	The pH of salt used to make tasty and crispy pakoras is 14. Identify the salt and write a chemical equation for its formation. List its two uses. **[CBSE 2013, 2018]**	
Answer	1) $NaHCO_3$ (Sodium Hydrogen Carbonate/ Sodium Bicarbonate) 2) $NaCl + H_2O + CO_2 + NH_3 \rightarrow NH_4Cl + NaHCO_3$ Uses: 1. For making baking powder 2. Is an ingredient of antacid.	
8	A compound P forms the enamel of teeth. It is the hardest substance of the body. It doesn't dissolve in water but gets corroded when the pH is lowered below 5.5. (a) Identify the compound P. (b) How does it undergo damage due to eating chocolate and sweets? What should we do to prevent tooth decay? **[CBSE 2013,2014]**	
Answer	Compound P is calcium phosphate $Ca_3(PO_4)_2$ Chocolate and sweets contain sugar which is converted into acid in our mouth and this acid with pH less than 5.5 erodes the tooth enamels and causes tooth decay. 1. To prevent tooth decay we should brush our teeth with toothpaste that neutralizes the excess acid produced in our mouth. 2. Avoid eating too many products of sugar and after eating any food wash your mouth with water gently to avoid any acid formation that causes tooth decay.	
9	"Sodium hydrogen carbonate is a basic salt". Justify this	

	statement.**[CBSE 2019,2014]**	
Answer	Sodium hydrogen carbonate is a salt produced by the neutralization reaction between a strong base (NaOH) and a weak acid (H_2CO_3), hence it is a basic salt.	
10	What is meant by 'water of crystallization' of a substance? **[CBSE 2014, 2015]**	
Answer	Water of crystallization is the fixed number of water molecules present in 1 formula unit of salt.	
11	Name the acid present in the following: a. Tomato, b. Vinegar, c. Tamarind.**[CBSE 2015, 2014]**	
Answer	(a) The acid present in tomatoes is oxalic acid. (b) The acid present in vinegar is acetic acid. (c) The acid present in tamarind is tartaric acid.	
12	Write the chemical formula of Bleaching powder. How is bleaching powder prepared? For what purpose is it used in drinking water? **[CBSE 2016, 2013]**	
Answer	$CaOCl_2$, Bleaching powder is prepared by passing Cl_2 gas through dry slaked lime. $Ca(OH)_2 + Cl_2 \rightarrow CaOCl_2 + H_2O$ It is used for the disinfection of water in the treatment process.	
13	List the important products of the Chlor-alkali process. Write one important use of each. **[CBSE 2020, 2023]**	
Answer	Sodium hydroxide- It is used in the manufacturing of paper. Chlorine - It is used to make plastics (PVC), chlorofluorocarbon(CFC) , chloroform, carbon tetrachloride e.t.c. Hydrogen- It is used in the hydrogenation of oils to obtain vegetable ghee	
14	Give reasons for the following:(i) Only one half of water molecule is shown in the formula of plaster of Paris **[CBSE 2020,CBSE Sample paper 2017]**	
Answer	The Formula actually means that two molecules (or two formula units) of $CaSO_4$ share one molecule of water so that the	

	effective water of crystallization for one $CaSO_4$ unit comes to half a molecule of water.	
15	What happens when CO_2 is passed through lime water? **[CBSE 2013, 2017]**	
Answer	white precipitate of calcium carbonate is formed. $Ca(OH)_2(aq)+CO_2(g)\rightarrow CaCO_3(s)\downarrow+H_2O(l)$	
16	a.The blue color of crystals of a substance on heating in a closed test tube gets changed but the color was regained after sometime on cooling. Name that substance and write its chemical formula. Explain the phenomenon involved. b. Write name and chemical formulae of two such compounds whose one unit is associated with 10 and 2 water molecules respectively **[CBSE 2015, 2016]**	
Answer	(a) The available informatin suggests that the blue crystals are of hydrated copper sulphate ($CuSO_4.5H_2O$). Upon heating, they were dehydrated. On cooling, they were again hydrated. The chemical reactions involved are : $\underset{(\text{Blue})}{CuSO_4.5H_2O} \xrightarrow{\text{Heat}} \underset{(\text{White})}{CuSO_4} + 5H_2O$ $\underset{(\text{White})}{CuSO_4} + 5H_2O \rightarrow \underset{(\text{Blue})}{CuSO_4.5H_2O}$ (b) Hydrated sodium carbonate (Washing soda) : $Na_2CO_3.10H_2O$ Hydrated calcium sulphate (Gypsum) : $CaSO_4.2H_2O$.	
17	How is sodium hydroxide produced? Write the balanced chemical equation also. Why is this process called the chlor-alkali process? In this process name the products given off at: (a) anode (b) cathode **[CBSE 2022, 2015,]**	
Answer	When electricity is made to pass through an aqueous solution of NaCl, it decomposes to form NaOH. This process is called chlor-alkali process because of two products-chlor for Chlorine and alkali for Sodium hydroxide. (a) Anode - Cl_2 Gas	

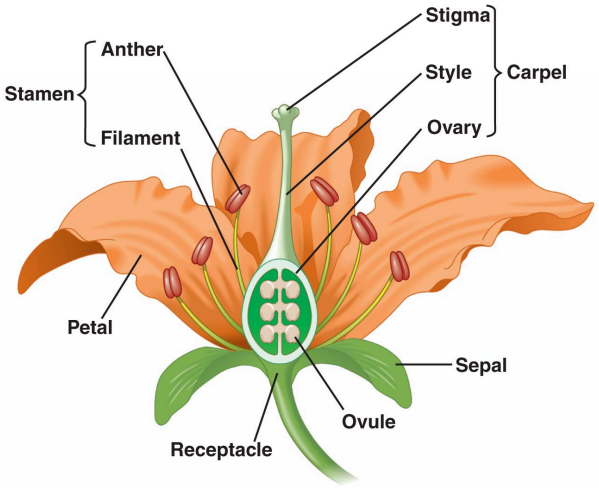
	(b) Cathode - H_2 Gas $\underset{\text{(Sodium chloride)}}{2\,NaCl(aq)} + \underset{\text{(Water)}}{2H_2O(l)} \xrightarrow{\text{Electricity}} \underset{\text{(Sodium hydroxide)}}{2\,NaOH(aq)} + \underset{\text{(Chlorine)}}{Cl_2(g)} + \underset{\text{(Hydrogen)}}{H_2(g)}$	
18	a. Identify the acid and the base whose combination forms the common salt that you use in your food. Write its chemical formula and chemical name of the salt. b. What is rock salt? Mention its color and the reason due to which it has this colour **[CBSE 2019,2013]**	
Answer	A. HCl is an acid and NaOH is a base whose combination forms the common salt. Its formula is NaCl Sodium chloride. It is obtained from sea water. B. Deposits of solid salt which are large crystals and brown due to impurities is called rock salt. C. This brown color is due to all the impurities present in the salt along with sodium chloride. When the impurities are removed and pure sodium chloride is obtained, it turns into white crystals.	
19	Write chemical equations when zinc granules react with a. Sulphuric acid, b. Hydrochloric acid.**[CBSE 2014, 2020]**	
Answer	• When zinc granules are added to the solution of sulphuric acid then zinc sulfate and hydrogen gas are formed as the product. • The chemical reaction is as follows, • $Zn(s) + H_2SO_4(aq) \rightarrow ZnSO_4(aq) + H_2(g)$ • When zinc granules are added to the solution of hydrochloric acid then zinc chloride and hydrogen gas are formed as the product. • The chemical reaction is as follows, • $Zn(s) + 2\,HCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$	
20	Out of HCl and CH_3COOH, which one is a weak acid and why? Explain with the help of an example **[CBSE 2013,2019]**	
Answer	Acetic acid (CH_3COOH) ionizes partially in water, hence, it is a weak acid.	

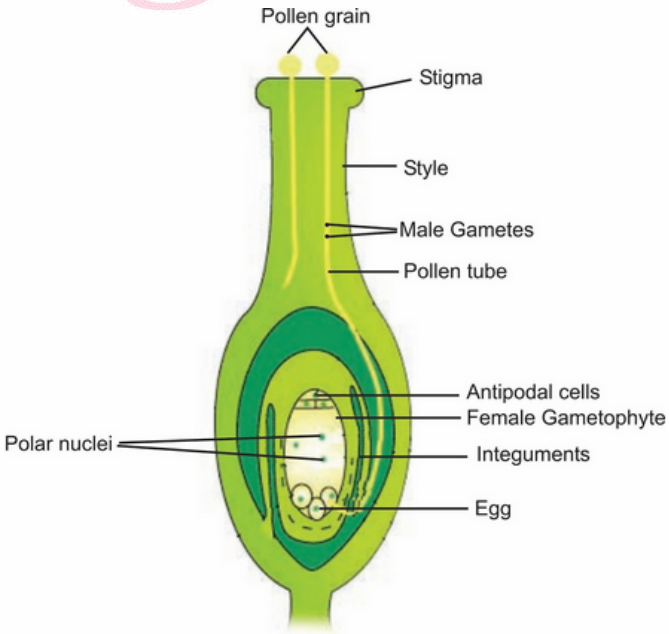
SUBJECT:
CLASS: X
CHAPTER: How do organisms reproduce ? No. of PYQs:20

Sl No	QUESTIONS	MARK
1	(i) Name and explain the two modes of asexual reproduction observed in Hydra. (ii) What is vegetative propagation ? List two advantages of using this technique. **(2023)** Ans. By budding and fragmentation, hydra can reproduce asexually. A bud, or protrusion, is created during budding; this bud matures into an adult and separates from the main body. The body splits in two during fragmentation, with regeneration occurring after. Vegetative propagation is a process in which any vegetative part of a plant root stem or leaf gives rise to a new plant under appropriate conditions. Two advantages: i Large number of plants obtained in a short interval. ii Propagation of seedless plants is made possible.	2
2	What happens when: 1. Leaves of Bryophyllum fall on the soil ? 2. Planaria is cut into many pieces? 3. Sporangia of Rhizopus on maturation liberates spores ? Mention the modes of reproduction in each of the above cases. **(2023, 2020)** Ans. 1. When Bryophyllum leaf falls on the wet soil, the buds that are produced in the notches along the leaf will develop into new plants by the process known as vegetative propagation. 2. When Planaria accidentally gets cut into many pieces, each piece grows the missing part and forms the complete organism. This form of asexual reproduction is known as regeneration. 3. When the sporangia of Rhizopus burst upon maturation, the spores spread out. So, with the help of different agents, the spores are transferred to various places and when they land on	3

	a particular surface, a new organism (mycelium) starts growing.	
3	Write the changes that occur in a flower once the fertilization has taken place ? **(2023)** Ans. After fertilization, the flower loses its shine. After fertilization four major changes that take place are development of endosperm and embryo, development or maturation of ovules into seeds and formation of fruit from ovary.	2
4	(i) Where are testes located in human males and why ? State two functions of the testes. (ii) In the human female, one of the ovaries releases an egg every month. State the changes that take place if The egg is fertilized The egg is no fertilized (iii) What is done during the surgical method in males and females to prevent pregnancy ? **(2023)** Ans. I. A pair of the testis is placed in a structure called scrotum which is located outside the abdominal cavity. The testis is located outside the body because sperms develop best at a temperature several degrees cooler than normal internal body temperature. II. The main function of the testes is producing and storing sperm. They're also crucial for creating testosterone and other male hormones called androgens. 1. The fertilized egg develops into an embryo, which eventually grows into a fetus. 2. If the egg is not fertilized: - The unfertilized egg disintegrates and is expelled along with the lining of the uterus during menstruation III. For male the surgical technique to prevent pregnancy is Vasectomy. For females the surgical technique to prevent pregnancy is Tubectomy.	5
5	(a) Why is it not possible to reconstruct the whole organisms from a fragment in complex multicellular organisms ? (b) Sexual maturation of reproductive tissues and organs are necessary links for reproduction. Elucidate. **(2013)** Ans. (a) The reason is that many multicellular organisms are not simply a random collection of cells. Specialized cells are organized as tissues, and tissues are organized into organs,	3

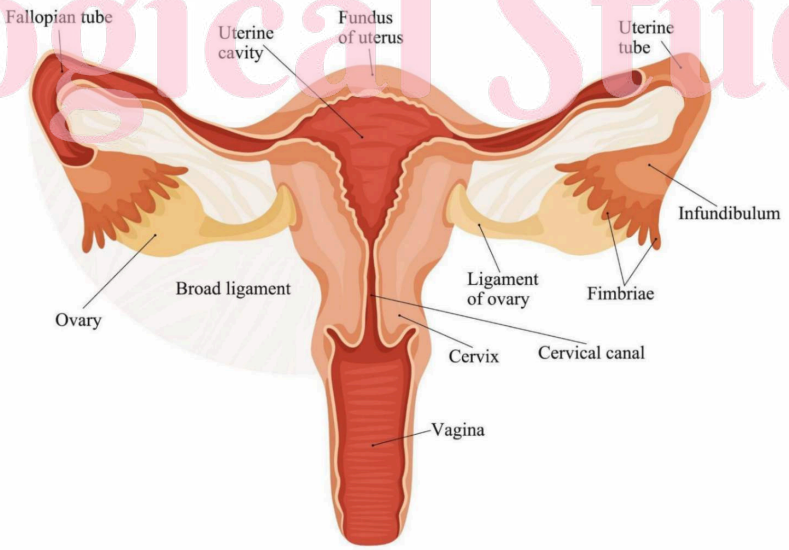
	which then have to be placed at definite positions in the body. Therefore, cell-by-cell division would be impractical. (b) Sexual maturation of reproductive tissues is a necessary link for reproduction. This is because of the need for germ-cells to participate in sexual reproduction . The germ-cells are produced only in mature reproductive tissues . The body of the individual organism has to grow to its adult size.	
6	Mention the changes that occur in the following after fertilization in a flower: Petals Zygote Ovary Ovule **(2021, 2022)** Ans. 1. The petals fall off after fertilization as they only serve the function to attract pollinators and protect the ovary. 2. After fertilization, the fertilized ovule forms the seed while the tissues of the ovary become the fruit. In the first stage of embryonic development, the zygote divides to form two cells; one will develop into a suspensor, while the other gives rise to a proembryo. 3. Flowers exhibit two changes after fertilization. The first change involves the rapid growth and conversion of the ovary into the fruit. The second change involves the formation of a tough coat around the ovule, which then changes into seeds.	2
7	Name the reproductive parts of an angiosperm. Where are these parts located ? Explain the structure of its female reproductive part ? **(2021, 2019).** Ans. The male reproductive organ of an angiosperm is stamen or androecium and the female reproductive organ of an angiosperm is pistil or carpel or gynoecium. The stamen consists of a filament and another. The anther contains four microsporangia within which microspores or pollens are developed. The carpel consists of stigma, style, and ovary. Stigma is the landing platform for pollen grains. The style is an elongated part beneath the stigma. The ovary is the basal bulged part of the pistil. It contains ovules. Pollen and ovule are reproductive parts of angiosperms. The ovary is located in the flower. Ovules develop into seeds after fertilization.	5

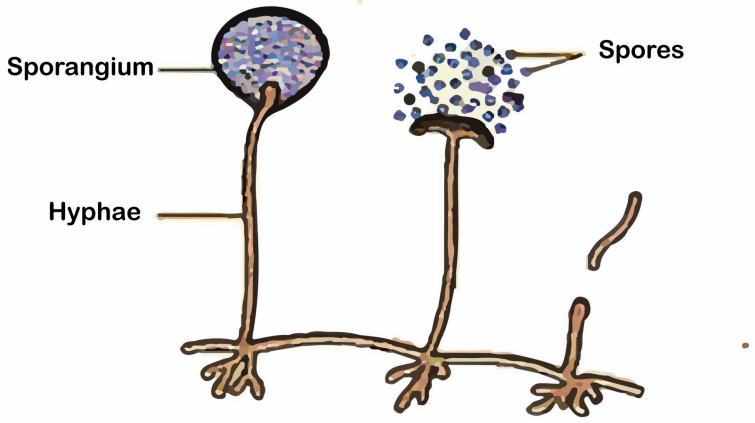
		
8	Give reasons : 1. Placenta is extremely essential for fetal development. 2. Uterine lining becomes thick and spongy after fertilisation. **(2021, 2018)** Ans. (i) The placenta also produces hormones that help maintain the pregnancy and support the growth and development of the baby. (ii) The uterine lining (endometrium) becomes thick and spongy after fertilization because this is necessary for the implantation of the fertilized egg (embryo) into the uterine lining.	2
9	What is vegetative propagation? List with brief explanation three advantages of practicing this process for growing some types of plants. Select two plants from the following which are grown by this process: Banana, Wheat, Mustard, Jasmine, Gram. **(2020, 2022).** Ans. Vegetative reproduction is any form of asexual reproduction occurring in plants in which a new plant grows from a fragment of a parent plant or a specialized reproductive structure. Advantages of practicing this process- The plants which cannot be produced from seeds can be produced through vegetative propagation. It is helpful in preserving genes from the parent body and can produce genetically similar plants. It is cost-effective and easily produced. Bananas and Jasmine are grown by this process.	4

10	Name two infections which can be sexually transmitted in human beings. List two examples each of diseases caused due to (i) bacterial infection and (II) viral infection. How can they be prevented **(2020, 2017, 2015, 2019).** Ans. Sexually transmitted diseases are those diseases that can be transmitted from infected person to health by sexual contact. It can be caused by virus and bacteria such as Virus: AIDS and hepatitis B. Bacteria: Gonorrhea and syphilis. Sexually transmitted diseases can be prevented by: Avoid blood transfusion from an infected person. Avoid multiple or unknown sexual partners. Used needles and syringes should not be reused. Proper treatment should be given to the pregnant woman to prevent the child getting infected.	5
11	Draw a neat diagram showing fertilization in a flower and label (a) pollen tube (b) Male germ cell and (c) Female germ cell on it. Explain the process of fertilization in a flower. What happens to the (i) ovary and (Ii) ovule after fertilization ? **(2020)** Ans.  In plants, fertilization is a process of sexual reproduction, which occurs after pollination and germination. Fertilization can be defined as the fusion of the male gametes (pollen) with the	5

	female gametes (ovum) to form a diploid zygote. It is a physicochemical process which occurs after the pollination of the carpel. Fertilization occurs when one of the sperm cells fuses with the egg inside of an ovule. After fertilization occurs, each ovule develops into a seed. Each seed contains a tiny, undeveloped plant called an embryo. The ovary surrounding the ovules develops into a fruit that contains one or more seeds.	
12	(a) What is puberty ? (b) Describe in brief the functions of the following parts in the human male reproductive system ? (I) Testes (II) Seminal Vesicles (III) Vas deferens (IV) Urethra (c) Why are testes located outside the abdominal cavity ? (d) State how sperms move towards the female germ cell. **(2020)** Ans. a) Puberty is the process of physical changes in the body through which a child's body matures and turns into an adult body and becomes capable of sexual reproduction. b) (i) Testes: It is the male gonad and part of the genital tract. It is the organ that produces sperm and male sexual hormone, testosterone. (ii) Seminal vesicle: It secretes fluids onto the sperms for ease of transport and nutrition (iii) Vas deferens: It is a tube transporting spermatozoa from the epididymis to the prostate part of the urethra. (iv) Urethra: It brings the urine from the kidneys to the urinary bladder c) because the temperature of the testicles needs to be cooler than the inside of the body. d) The sexual reproduction process combines male and female gametes each with a single haploid chromosome set to produce diploid zygotes. Sperm actively move around the female reproductive tract by swimming Having a tail in the semen helps to swim in the womb. Uterine suction and fallopian tube peristalsis help sperm movement.	5

	Cervical mucus is thought to help sperm swim in the female reproductive tract.	
13	Explain multiple fissions. Give examples ? **(2016, 2019, 2021)** Ans. Multiple fission is the process of asexual reproduction in which instead of 2 daughter cells, many daughter cells are produced from the parent cell. In this, the nucleus undergoes repeated division to produce a large number of nuclei. Each nucleus along with a little bit of cytoplasm forms a membrane around it. All the daughter cells are equal sized and are similar. Plasmodium, true slime molds (Myxomycetes) exhibit this type of asexual reproduction.	2
14	Define pollination. Explain the different types of pollination. List two agents of pollination. How does suitable pollination lead to fertilization ? **(2019, 2016, 2021)** Ans. Pollination: Is defined as the deposition of pollen grains on the stigma of a flower from anthers belonging to the same flower, same plant or a different plant. Pollination is of two types Self pollination - Stigma receives pollen grains from the same flower Cross pollination - Stigma receives pollen grains from a flower on the same plant or a different plant Wind and insects are two agents of pollination, called as Anemophily and Entomophily respectively Example of wind pollination - Grasses, Gymnosperms etc Example of insect pollination - Rose, Euphorbia sps etc Pollination and fertilization - Suitable pollination leads to compatible pollen grains being deposited on the stigma, leading to pollen tube development and fertilization.	3

15	a. Draw a diagram of human female reproductive system and label the parts: Which produce an egg Where fertilization takes place B. List two bacterial diseases which are transmitted sexually. C. What are contraceptive devices? Give two reasons for adopting contraceptive devices in humans **(2019, 2017, 2016)** Ans. B. Bacterial infections include chlamydia, gonorrhea, and syphilis. Viral infections include human papillomavirus (HPV), herpes (HSV or herpes simplex virus), human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS) and Hepatitis B. C. Contraceptive methods are mainly adopted because of the following reasons: To prevent unwanted pregnancies. To control population rise or birth rate. To prevent the transfer of sexually transmitted diseases.  	5
16	How does plasmodium reproduce ? Is this method sexual or asexual ? **(2017)** Ans. Plasmodium does follow the asexual method of reproduction. Plasmodium reproduces by multiple fissions. The nucleus produces many nuclei by undergoing division. The nuclei result in the formation of daughter cells into the cyst..	2
17	State the basic requirement for sexual reproduction. Write the	3

	importance of such reproduction in nature. **(2017).** Ans. The basic requirements for sexual reproduction to take place is the involvement of two parents and fusion of their haploid gametes. In the sexual reproduction, a new individual is formed which is diploid in nature, the gametes, one from the male parent and the other from the female parent.	
18	List three techniques that have been developed to prevent pregnancy. Which one of these techniques is not meant for males ? How does the use of these techniques have a direct impact on the health and prosperity of a family ? **(2017, 2018, 2020).** Ans. Barrier method: use of condoms. Surgical methods: vasectomy (in male), tubectomy (in female). Intrauterine devices: copper T. Oral contraception: oral hormonal pills. These methods help to take care of mother and child. It also helps in maintaining a gap between the children so that they can use resources properly.	3
19	Describe reproduction by spores in Rhizopus. **(2017, 2015, 2020, 2022).** Ans. They reproduce asexually by the formation of the spores. The body of the fungus is composed of hyphae which develop the sporangium. The sporangium is a swollen structure at the tip of the filaments bearing the spores. The spores are tough and resistant structures which are dispersed by the breaking of the sporangium.  **Spore formation in Rhizopus**	2

20	Difference between the asexual and sexual reproduction ? Also, give one example of each **(2016, 2018, 2021, 2022)** Ans.	3

S.No.	Sexual Reproduction	Asexual Reproduction
1.	It is a kind of reproduction where there is the involvement of one or two organisms or individuals.	It refers to the kind of reproduction that involves only one organism.
2.	Two parents are involved.	one parent is involved.
3.	Gamete formation occurs	It does not occur
4.	Sex organs are formed	No formation of sex organs
5.	Zygote forms through a fusion of gametes	The zygote does not form
6.	Higher invertebrates and all vertebrates	Lower organisms

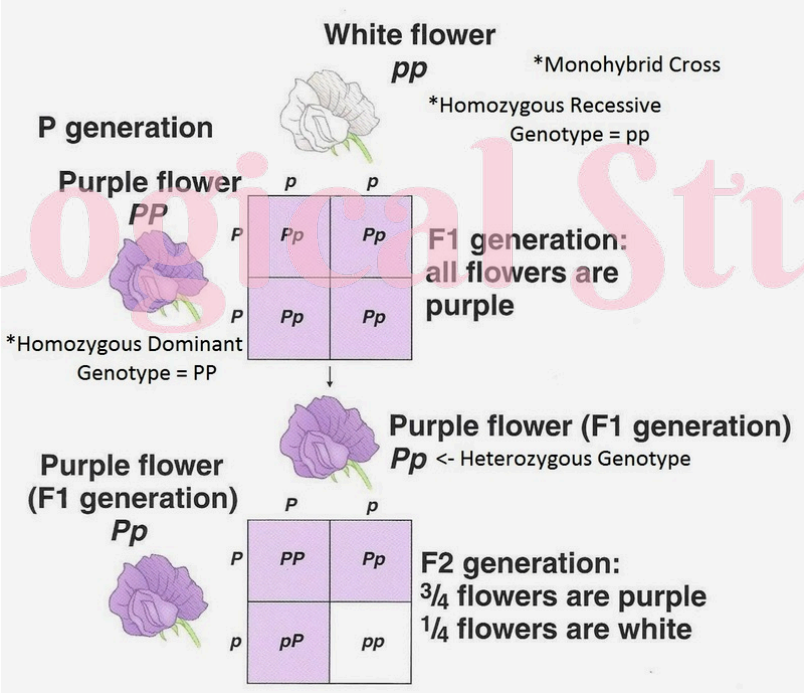
SUBJECT:
CLASS: X

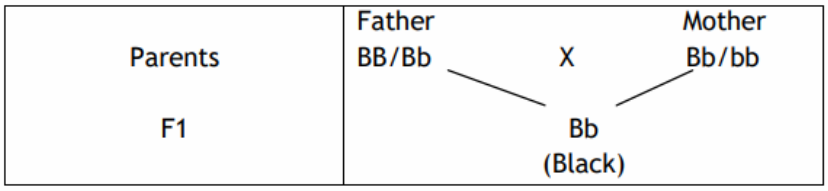
CHAPTER: Heredity No. of PYQs:20

Sl No	QUESTIONS	MARK
1	When self pollinated F1 plants were cross - pollinated with plants having tt genes, a total of 800 plants were produced. How many of these would be tall, medium height or short plants? Give the genotype of F2 generation **(2018).** Ans. When self-pollinating F1 plants, out of 800 plants produced, 600 will be medium height, 200 will be tall, and 200 will be short. The genotype of the F2 generation will be Tt (medium height), TT (tall), and tt (short) assuming T is the dominant allele for tallness and t is the recessive allele for shortness.	3
2	How does Mendel's experiment show that traits are inherited independently ? **(2016).** Ans. Mendel crossed two pea plants differing in contrasting traits of two characters i.e a dihybrid cross. He crossed a pea plant having yellow coloured and rounded seeds with another pea plant having green coloured and wrinkled seed. The F1 generation has all round and yellow seeds. The F2 generation, all the characters inherited independently. (round yellow, round green, wrinkled yellow, wrinkled green.	2
3	A mendelian experiment consisted of breeding pea plants being violet flowers with pea plants bearing white flowers. What will be the result in F1 progeny ? **(2018)** Ans. The Mendelian Experiment consisted of using pure line parents which means the violet and white flowers were pure lines. So the F1 will have all heterozygous progeny. The phenotype will be all violet since violet is the dominant character	2

	so it will be expressed in all F1 generation.	
4	How many pairs of chromosomes are present in human beings ? **(2020)** Ans. Humans typically have 23 pairs of chromosomes, or 46 chromosomes in total. Chromosomes are made up of long strands of DNA, which contain all the body's genes.	2
5	(a) Why did Mendel carry out an experiment to study inheritance of two traits in garden peas? (b) What were his findings with respect to inheritance of traits in F1 and F2 generation ? (c) State the ratio obtained in the F2 generation in the above mentioned experiment ? **(2020)** Ans. a) Mendel carried out an experiment to study the inheritance of two traits in garden pea because of the following: traits are easily observable in peas, the life cycle is short as compared to others, a large number of offsprings and cross-pollination was easy as compared to others. b) All progeny formed are phenotypically dominant but having heterozygous genotypes. c) The ratio of both genotype and phenotype obtained is 3:1, whereas: F1 generation is monohybrid F2 generation is monohybrid.	4
6	(a) Name the two types of gametes produced by men. (b) Does a male child inherit X chromosome from his father ? Justify (c) How many types of gametes are produced by a human female ? **(2022)** Ans. Man produced two types of gametes are sperms and male heterogamy. Male sex character is determined by the Y-chromosome inherited from the male parent. Hence, a male has sex chromosomes X and Y, while a female has XX as sex chromosomes. During fertilization, the mother always contributes an X chromosome while the father either contributes an X or a Y chromosome.	4

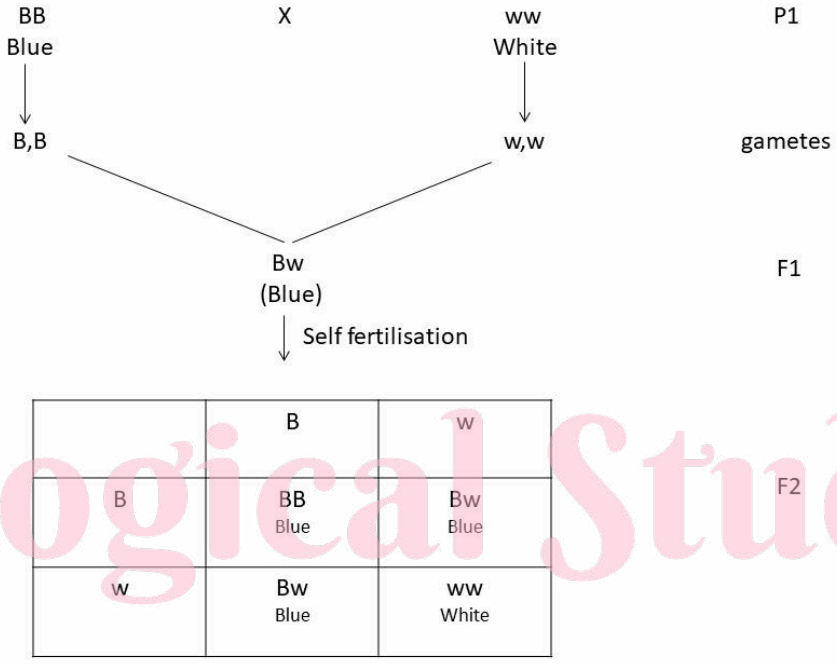
	Female gametes in humans are called ova/egg. It is produced by the ovaries. Female produces two types of gametes	
7	1. What is DNA ? 2. What is chromosome ? 3. Explain how, in sexually reproducing organisms, the number of chromosomes in the progeny is maintained ? **(2016, 2017)** Ans. DNA is the hereditary material in humans and almost all other organisms. Genes are made up of DNA. Chromosomes are threadlike structures made of protein and a single molecule of DNA that serve to carry the genomic information from cell to cell. They transfer hereditary characters to offspring. Sexual reproduction includes gametogenesis via meiosis and random fertilization of male and female gametes. Meiosis reduces the chromosome number to half in gametes and fertilization restores the somatic chromosome number in the zygote.	3
8	" The sex of a new born child is a matter of chance and none of the parents may be considered responsible for it" Justify this statement . **(2019, 2021,)** Ans. The hemizygous males produce two kinds of gametes, 1/2 gametes with X- and 1/2 with Y-chromosome (22 A + X and 22 A + Y). Fertilization of egg (22 + X) with sperm carrying 22+X chromosomes results in female child (44A + XX). Fertilization of egg (22 + X) with a sperm carrying 22+Y chromosomes results in a male child (44A + XY).	3
9	How do Mendel's experiment show that the Traits may be dominant or recessive ? Traits are inherited independently? **(2015, 2017)** Ans. Mendel's experiments show that the Traits may be dominant or recessive by performing a monohybrid cross. Monohybrid cross between two pure breeding varieties always obtained hybrid progeny exhibiting one parental trait while the opposite trait was never expressed in the F1 generation. Individual traits are randomly distributed during gamete development, according to Mendel's law of independent assortment, when two or more characters are inherited. As a result, each allele of a pair segregates independently, with each	3

	gamete containing one allele of that characteristic.	
10	In a pea plant, the trait of flowers bearing purple color (PP) is dominant over white color (pp). Explain the inheritance pattern of F1 and F2 generations with the help of a cross following the rules of inheritance of traits. State the visible characters of F1and F2 Progenies. **(2019, 2021)** Ans. Purple flowered plants and white flowered plants in a 3 : 1 ratio. If pure purple flowered plants are crossed with white flowered plants, all plants of F1 generation are heterozygous purple flowered plants. Upon self-pollination of F1 progeny, purple flowered and white flowered plants are produced in a 3:1 ratio.  	5
11	The gene for red hair is recessive to the gene for black hair. What will be the haircolor of a child if he inherits a gene for red color from his mother and a gene for black hair from his father? Express with the help of a flow chart. **(2021, 2022).** Ans. The hair color of a person will be black because the black hair gene is dominant over the red hair gene. Also, it will be regardless of which parent passes a dominant or recessive gene. Dominant gene will express themselves in all	3

	the cases and the recessive gene can only express itself in the absence of a dominant gene. Red hair - Mother - Recessive ∴ bb Black hair - father Dominant ∴ BB  	
12	i) In a cross between pea plants having round green seeds and wrinkled yellow seeds, what progeny is expected in F1 and F2 generation? ii) What would be the impact on the ratio of F2 generation, if F1 progeny plants inherited a single whole gene set from each parent? Give reason for your answer. **(Practice question paper-2022-2023).** Ans. Parents: RRyy (Round green) X rrYY (Wrinkled Yellow) Gametes: Ry rY F1: RrYy Selfing of F1: RrYy (Round yellow) X RrYy (Round yellow) Gametes: RY, Ry, rY and ry X RY, Ry, rY and ry F2: RRYY, RRYy, RrYY, RrYy (Round yellow) RRYy, RRyy, RrYy, Rryy (Round yellow) RrYY, RrYy, RrYy, Rryy, (Round yellow) rrYY, rrYy, rrYy (Wrinkled yellow) rryy (Wrinkled green) The new combination of characters are: Round yellow and Wrinkled green. apart from parental combinations - Round green and Wrinkled yellow.	2
13	Mustard was growing in two fields- A and B. While Field A produced brown coloured seeds, field B produced yellow coloured seeds. It was observed that in field A, the offspring showed only the parental trait for consecutive generations, whereas in field B, the majority of the offspring showed a variation in the progeny. What are the probable reasons for these? **(2019, 2021).** Ans. Pollination is a method of sexual reproduction in plants where pollen grains from the anther of one plant are transferred to the stigma of another. Self Pollination occurs in plants with the same or genetically similar flower . It results in consecutive	3

	generations with the parental trait . Cross Pollination occurs in plants with one flower with another flower . It results in new generations with variations in their traits Hence, variation in parental trait is possible in case of Cross Pollination and not Self Pollination In field A, since offspring showed same parental trait, it is Self Pollination In field B, since offspring showed different parental trait, it may be case of Cross-Pollination.	
14	In an asexually reproducing species, if a trait X exists in 5% of a population and trait Y exists in 70% of the same population, which of the two traits is likely to have arisen earlier? Give reason.**(2019, 2021).** Ans. In asexual reproduction, DNA is copied as it is from one generation to another, there is no mating or mixing of genes. Asexual reproduction results in offspring with identical genetic information. There is very little genetic variation between parent and offspring It takes large amount of time for different trait to develop in case of asexual reproduction Hence, if a trait exist in 70% of population, it would have arisen earlier as it would have been replicated over more number of generations	3
15	Two pea plants - one with round yellow seeds (RRYY) and another with wrinkled green (rryy) seeds produce F1 progeny that have round, yellow (RrYy) seeds. When F1 plants are self-pollinated, which new combination of characters is expected in F2 progeny? How many seeds with these new combinations of characters will be produced when a total 160 seeds are produced in F2 generation? Explain with reason. **(2018, 2020, 2022)** Ans. Two pea plants, one with round green seeds (RRyy) and another with wrinkled yellow (rrYY) seeds produce F1 progeny that has round, yellow (RrYy) seeds. When F1 plants are selfed, the F2 progeny will have a new combination of characters, the combination will be round, yellow and wrinkled green.	5
16	Sahil performed an experiment to study the inheritance pattern of genes. He crossed tall pea plants (TT) with short pea plants (tt) and obtained all tall plants in F1 generation. a. What will be the set of genes present in the F1 generation?	4

	b. Give reason why only tall plants are observed in F1 progeny. **(2016,2021, 2022)** Ans. (a) Dominant trait is tallness which is represented by TT and recessive trait is dwarfness which is represented by it . Thus, on crossing the dominant trait with dwarf trait , Tt will be obtained Hence , Tt will be the set of genes present in the F1 Generation . (b) According to Mendel's law of monohybrid inheritance and law of segregation , if a single pair of contrasting characteristics were cross-bred by self-pollination , then , in F1 progeny , plants with dominant traits are produced . Thus only tall plants are observed in the F1 Progeny because T are called dominant traits and they express themselves .	
17	List difference between dominant traits and recessive traits. What percentage of the plants in the F2 generation were round, in Mendel's dihybrid cross between round yellow and wrinkled green pea plants ? **(2016, 2015, 2019).** Ans. Dominant traits are always expressed when the connected allele is dominant, even if only one copy of the dominant trait exists. Recessive traits are expressed only if both the connected alleles are recessive. If one of the alleles is dominant, then the associated characteristic is less likely to manifest.	3
18	"A trait may be inherited, but may not be expressed" Justify this statement with help of a suitable example. **(2015, 2016, 2017)** Ans. In the F1 generation of monohybrid cross, the percentage of tall plants is 100% and in the F2 generation it is 75 %. Remaining 25% plants of F2 generation will be dwarf.	3
19	A pea plant with a blue-coloured flower, denoted by BB, is cross-bred with a pea plant with white flower, denoted by ww. What is the expected color of the flowers in their F1 progeny ? What will be the percentage of plants bearing white flowers in F2 generation, when the flowers of F1 plants are self pollinated ? State the expected ratio of the genotypes BB and Bw in the F2 progeny ?**(2013, 2015, 2017).** Ans. The cross can be represented as shown:	5

	a) The color of flowers in F1 progeny is blue. b) The phenotypic ratio of blue and white flowers in F2 generation is 3 : 1 So, percentage of plants bearing white flowers in F2 Generation = 1/4 x 100 = 25% c) The ratio of genotype BB and Bw in F2 progeny: 1: 2  	
20	1. Mention any two points of difference between acquired and inherited traits. If the tail of a mouse is cut for twenty one generations, will the tail occur in the twenty second generation of that mouse? Give reason to support your answer. **(2013, 2016, 2017, 2022, 2021).** Ans. Inherited trait: Inherited traits are those that are passed down from parents to children. An individual's inherited traits are determined by their genes. 1.Characters are passed down from generation to generation. 2. These characteristics are caused by changes in genes or DNA. 3. Human inherited traits include hair, skin, eye color, body type, height, and susceptibility to certain diseases.	3

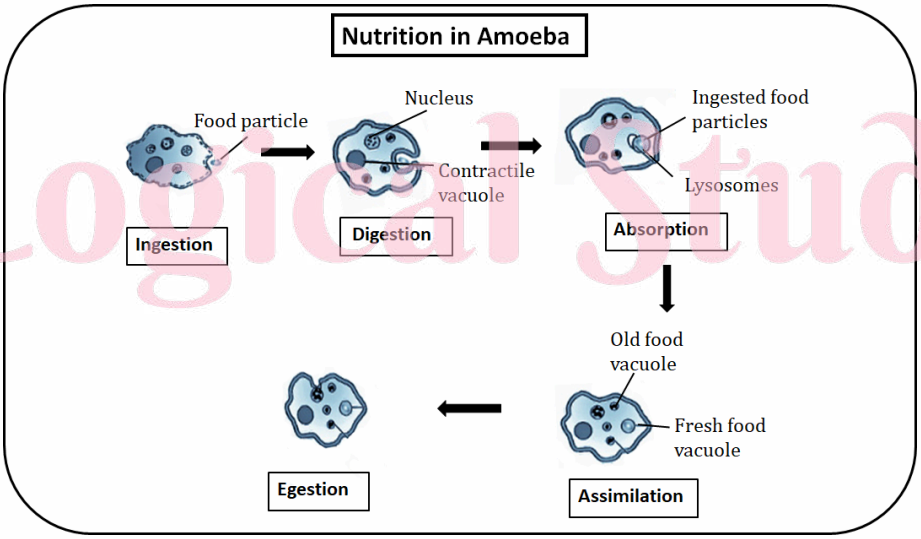
	Acquired trait: An acquired trait is a personality trait that develops in a person as a result of environmental influences. 1. Characters are not passed down from generation to generation 2. These characteristics emerge in response to their surroundings or lifestyle. 3. These characteristics are not encoded by a living organism's DNA and thus cannot be passed down to future generations.The mouse will continue to have information for presence of tail in its DNA. So, it will- continue to have a tail because absence of tail is an acquired trait.	

SUBJECT:
CLASS: X

CHAPTER: Life Processes No. of PYQs:20

Sl No	QUESTIONS	MARK
1	Two green plants are kept separately in oxygen-free containers, one in the dark and other in sunlight. It was observed that plants kept in the dark could not survive longer. Give reason for this observation **(2023)** Ans. The plant which is kept in continuous light will live longer. We know that plants release carbon dioxide during respiration. In the case of plants which are being kept in the dark. carbon dioxide will accumulate in the container. This will finally result in lack of oxygen for the plant and the plant would die. In the case of a plant which is being kept In light, carbon dioxide shall be utilized during photosynthesis and Oxygen will be released. This will help in maintaining the availability of oxygen for respiration. As a result, this plant will live longer.	2
2	List the events that place during the process of photosynthesis in the proper sequence **(2023)** Ans. The three events that occur during the process of photosynthesis are: (i) Absorption of light energy by chlorophyll. (ii) Conversion of light energy to chemical energy and splitting of water molecules into hydrogen and oxygen. (iii) Reduction of carbon dioxide to carbohydrates.	3
3	(a) With the help of an activity, explain the action of saliva on the food we eat (b) Why is bile juice important in the process of digestion ? **(2023).** Ans . (a) Here, boiled potatoes are mashed and divided into three sections. Divide the contents among test tubes A, B, and C. Iodine is introduced to test tube A. Saliva is added to test tube B after iodine has been added.	4

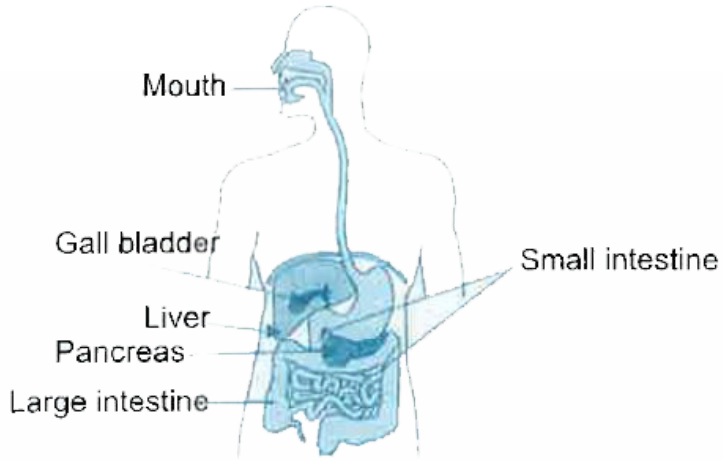
	Nothing is introduced and the control set is maintained in test tube C. Observation: The boiled potato in test tube A turns blue when exposed to the iodine solution. After adding iodine to the test tube B, saliva is added and combined with the sample. Therefore, when starch is broken down into simple sugars like maltose, a color change will be seen. As the salivary amylase in the saliva begins to break down the starch in test tube B, the blue hue begins to fade. There is no color shift in test tube C. (b) Bile is a fluid that is made and released by the liver and stored in the gallbladder. Bile helps with digestion. It breaks down fats into fatty acids, which can be taken into the body by the digestive tract.	
4.	Write two different ways in which glucose is oxidized to provide energy in the human body. Write the products formed in each case. **(2019)** Ans. There are two ways that glucose can be metabolized to release energy or generate energy: 1) Anaerobic respiration: This mechanism, which occurs in the cytoplasm, breaks down glucose into the three-carbon molecule pyruvate when oxygen is not present. Carbon dioxide and ethanol can be created from this pyruvate. Yeast is a popular medium for this procedure. 2) Aerobic respiration: In aerobic respiration, glucose is broken down into pyruvate, which is further broken down to produce three molecules of carbon dioxide and water when oxygen is present.	2
5.	Diffusion is insufficient to meet the oxygen requirement of multicellular organisms like humans. State reason. **(2017).** Ans. Since diffusion is a slow process and all cells are not in direct contact with one another in the environment, it is insufficient to supply the oxygen requirements of multicellular creatures like humans. The distance between the gas exchange surface and the places where oxygen is needed cannot be covered by diffusion because of its slow diffusion rate. For this reason, the bloodstream serves as our body's gas transport system. Allowing oxygen to be transferred via passive diffusion would be challenging since gradients would need to exist in	2

	each and every cell. Ultimately, it would be too cumbersome and slow for any multicellular organism to utilize.	
6.	Differentiate between autotrophs and heterotrophs and give one example of each **(2017).** Ans Autotrophs are known as producers because they are able to make their own food from raw materials and energy. Examples include plants, algae, and some types of bacteria. Heterotrophs are known as consumers because they consume producers or other consumers. Dogs, birds, fish, and humans are all examples of heterotrophs.	3
7.	Describe the process of nutrition in the amoeba with the help of a diagram **(2016, 2019)** Ans.  	3
8.	(a) What is double circulation ? (b) Why is the separation of the right side and the left side of the heartful useful ? How does it help birds and mammals ? **(2023, 2022, 2019)** Ans. (i) Double circulation is the circulation of blood through the heart twice during one complete cycle of the body. It is a type of circulation in which the blood passes through two different circuits of the body, namely, pulmonary circulation and systemic circulation. (ii) The separation of the right side and the left side of the heart is useful as it allows the oxygenated and deoxygenated blood to remain separate, which helps in maintaining the oxygen concentration in the body. In mammals and birds, the separation of the heart into four chambers helps	3

	to increase the efficiency of oxygen delivery to the body tissues. The right side of the heart receives the deoxygenated blood from the body and pumps it to the lungs for oxygenation. The left side of the heart receives the oxygenated blood from the lungs and pumps it to the rest of the body. This separation ensures that the oxygen-rich and oxygen-poor blood do not mix, and the oxygenated blood is delivered efficiently to the body tissues.	
9.	(a) State the role played by the following in the process of digestion: 1. Enzyme trypsin 2. Enzyme lipase (b) List two functions of finger-like projections present in the small intestine **(2013, 2019,2020)** Ans. (a) (i) Enzyme trypsin: Helps in the digestion of proteins. (ii) Enzyme lipase : Helps in the breaking down of emulsified fats. (b)Two functions of finger like projections present in the small intestine are" 1. Increase the surface area of the intestine. 2. Helps in absorption of digested food.	5
10.	(a) Describe the structure and function of the basic filtering unit of the kidney (b) List two factors on which the absorption of water from urine depends. **(2017, 2018, 2020)** Ans. (a) Nephron is the basic structural and functional unit of the kidney. Structure : A cluster of blood capillaries/glomerulus is associated with a cup-shaped structure called Bowman's capsule, which leads to a coiled tubular part of Nephron. Function : Collects the filtrate and reabsorbs useful substances like glucose, amino acids, salts and water from filtrate and forms urine. (b) Reabsorption of water from urine depends upon- 1. Amount of excess water in the body. 2. Amount of waste dissolved.	3
11.	What causes the movement of food inside the alimentary canal in human beings ? **(2014, 2018, 2019)** Ans. Food pushes forward due to regular contraction, expansion, and relaxation of muscular layers in the alimentary canal wall. This movement, known as peristalsis, happens	2

	throughout the whole gut.	
12.	Explain the ways in which glucose is broken down in the absence or storage of oxygen **(2017, 2018, 2019)** Ans. The anaerobic breakdown of glucose occurs in two different ways. The first stage in both processes is the cytoplasmic breakdown of the glucose molecule into pyruvate. Fermentation is the term for the anaerobic breakdown process in bacteria. Pyruvate is converted to carbon dioxide and ethyl alcohol during fermentation. Pyruvate is converted to lactic acid in our muscle cells when there is a shortage of oxygen. Note: In the two scenarios mentioned above, very little energy is emitted.	3
13.	(a) Write two water-conducting tissues present in plants. How does water enter continuously into the root xylem ? (b) Explain why plants have low energy needs as compared to animals.**(2017, 2019, 2021)** Ans. (a) Xylem tracheids and xylem vessels are water-conducting tissues (vascular tissue) as part of the xylem present in plants. Xylem is responsible for the conduction of water from the roots to other parts of the plant. Due to transpiration and the resulting pressure gradient, water is absorbed into the root xylem of plants. The transpirational pull formed causes the roots to absorb water from the soil and resulting in the transportation of water. (b) Plants have low energy needs as compared to animals due to the following reasons: (i) Plants are autotrophic organisms, preparing their own food absorbing solar energy during the process of photosynthesis. (ii) Plants don't move from one place to another like animals so they consume less energy. (iii) Also, plants possess many dead cells in terms of sclerenchyma cells that do not require much energy for maintenance.	5
14.	Write three points of difference between breathing and respiration. **(2015, 2016)** Ans. BREATHING: The process involves taking in and releasing air. It's a physical and voluntary procedure.	3

	The lungs are the conduit for the gaseous exchange. RESPIRATION: When there is oxygen present, complicated materials break down into simpler ones. It is a biological process that happens involuntarily. Gas exchange takes place in cell organelles such as mitochondria or in the membranes between cells.	
15.	List four functions of the human heart. **(2017, 2020)** Ans. Pumping oxygenated blood to other body parts. Pumping hormones and other vital substances to different parts of the body. Receiving deoxygenated blood and carrying metabolic waste products from the body and pumping it to the lungs for oxygenation. Maintaining blood pressure.	2
16.	Write three types of blood vessels. Give one important feature of each.**(2015, 2019)** Ans. Arteries carry blood away from your heart. Veins carry blood back toward your heart. Capillaries, the smallest blood vessels, connect arteries and veins.	3
17.	Draw a diagram of the human alimentary canal and label the following ; (1) part in which starch digestion is initiated (2) organ in which bile is stored (3) the gland that secretes digestive enzymes as well as hormones. (4) Part of the alimentary canal where water is reabsorbed. (5) Parts of the gut where finger-like projections are present to facilitate absorption of digested food. **(2016, 2019, 2020)** Ans. (1) Mouth (2) Gallbladder (3) Pancreas (4) Large Intestine (5) Small intestine.	5

		
18	State the location and function of gastric glands **(2015, 2018, 2020)** Ans. The following are the roles of the gastric glands found in the stomach wall: (a) The synthesis of the digestive enzyme pepsin. (b) Mucus secretion to shield the stomach's inner lining. (c) The release of hydrochloric acid, which causes the pepsin enzyme to activate.	2
19	In single-celled organisms, diffusion is sufficient to meet all their requirements for food, gas exchange, or removal of waste, but it is not in the case of multicellular organisms. Explain the reason for the difference. **(2015, 2019, 2022)** Ans. The surface area to volume ratio in unicellular organisms is ideal for material exchange or diffusion between the cell and its external environment, and this rate of exchange meets the needs of the unicellular organism. However, the surface area to volume ratio is low in multicellular organisms, and the only way for an organism to exchange with the outside world is through its surface, assisted by a particular structure or organ, such as the skin. Nevertheless, this exchange is insufficient to make up for the millions of cells that make up a multicellular organism, each of which has unique needs depending on its function.	3
20.	(a) Mention any two components of blood. (b) Trace the movement of oxygenated blood in the body. **(2014, 2016, 2017)**	2

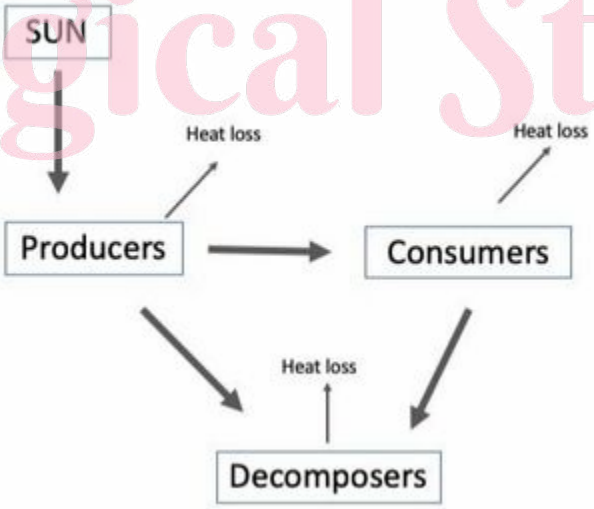
	Ans. (A) Blood is made up of platelets, white blood cells, and red blood cells. (b) After entering the left atrium, oxygenated blood travels to the left ventricle and all of the body's organs.	

SUBJECT:
CLASS: X

CHAPTER:Our Environment No. of PYQs:20

Sl No	QUESTIONS	MARK
1.	Use of several pesticides which results in excessive accumulation of pesticides in rivers or ponds, is a matter of deep concern. Justify this statement ? **(2023)** Ans. Several pesticides are taken up by aquatic plants and animals from water bodies, and they are absorbed by plants from the soil together with water and minerals. One way they get into the food chain is through this. Since these substances cannot break down, they gradually accumulate at every trophic level.	5
2	What are human-made ecosystems ? Give an example. Can a human-made ecosystem become a self-sustaining ecosystem ? Give reason to justify your answer **(2002)** Ans. These are taken up by aquatic plants and animals from water bodies, and they are absorbed by plants from the soil together with water and minerals. One way they get into the food chain is through this. Since these substances cannot break down, they gradually accumulate at every trophic level.	5
3	(i) Why are crop fields considered as artificial ecosystems? (ii) Write a common food chain of four steps operating in a terrestrial ecosystem. **(2021)** Ans. (i)Artificial ecosystems are ones that humans have altered and maintained for their own gain. Unlike untamed forest areas, agricultural fields are regulated pieces of land that must be turned into crops. To ensure a decent crop production, the soil is first prepared for seeding, then it is irrigated and monitored. Crop fields are therefore man-made ecosystems. (II) Step 1: This group includes plants and algae, and they	3

	produce their own nourishment. Step 2: Plant-eating herbivores make up the next level. Step 3: Carnivores that consume herbivores are the next level. Step 4: Carnivores that consume other carnivores make up the final level.	
4	What are consumers? Name the four categories under which the consumers are further classified? **(2021)** Ans. Organisms that feed directly or indirectly on producers and cannot synthesize their own food from inorganic sources are called consumers. Herbivores, Carnivores, Omnivores and Parasites are various categories of consumers.	5
5	(a) Write two harmful effects of using plastic bags on the environment. Suggest alternatives to the usage of plastic bags. (b) List any two practices that can be followed to dispose of the waste produced in our homes. **(2020)** Ans. (a) Plastic bags are a type of garbage that is not biodegradable, meaning that they cannot break down or disintegrate, leading to environmental damage. Because plastic waste acts as a breeding ground for insects and mosquitoes that transmit diseases like malaria and dengue fever, it creates unhygienic conditions in public areas. Options of using plastic bags instead of Paper and jute bags are biodegradable materials that can be used in place of plastic bags. (b) Waste from homes, businesses, and hospitals needs to be appropriately separated. Landfilling is the term for appropriately disposing of this trash in low-lying locations. Additionally, waste can be disposed of by composting or incineration.	2
6	(a) A food chain generally has three or four trophic levels. Explain. (b) What is biological magnification ?Explain **(2015, 2019)** Ans. (a) The food chain typically consists of three or four trophic levels since, after four trophic levels, very little useful energy is left because only 10% of energy is transferred from one trophic level to the next.	3

	(b) The process of increasing the concentration of hazardous and harmful compounds inside each subsequent level in the food chain is known as biological magnification, or biomagnification. Reptile ->snake-> bird-> frog-> grasshopper The bird's body will have the highest possible concentration of dangerous materials.	
7	Define an ecosystem. Draw a block diagram to show the flow of energy on an ecosystem **(2015, 2017, 2019).** Ans. Ecosystem can be defined as a system composed of biotic and abiotic components and the interactions between them The energy flow in an ecosystem is always from producers to consumers moving in the upward direction, that is from  	5
8	(a) How can we help in reducing the problem of waste disposal? Suggest any three methods. (b) Distinguish between biodegradable and non-biodegradable wastes **(2013, 2015, 2019)** Ans. By encouraging the use of recycled materials and reducing the use of throwaway things, we can lessen the issue of garbage disposal. separating garbage that is biodegradable from that that is not	5

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before disposing of it.
recycling the garbage that isn't biodegradable.

<table>
<tr><th>S.No.</th><th>Biodegradable waste</th><th>Non-biodegradable waste</th></tr>
<tr><td>1.</td><td>Biodegradable wastes are those substances that degrade or break down naturally.</td><td>Non-biodegradable wastes are those substances that do not degrade easily.</td></tr>
<tr><td>2.</td><td>Materials like plants, animals, their waste, paper, fruits, vegetables fall under the category of biodegradable substances.</td><td>Materials such as rubber, plastic, chemicals, and paint plastic fall under the category of the non-biodegradable items.</td></tr>
<tr><td>3.</td><td>The biodegradable waste occurs from natural products such as kitchen waste, organic waste, paper, etc.</td><td>It is usually seen that non-biodegradable substances are chemically synthesized and do not occur naturally.</td></tr>
<tr><td>4.</td><td>The rate of decomposition of biodegradable waste is fast.</td><td>The rate of decomposition of the non- biodegradable waste is slow.</td></tr>
<tr><td>5.</td><td>Microorganisms like bacteria, fungi, and others have the capability of decomposing the material into the soil.</td><td>The non- biodegradable substances do not degrade easily or by the action of natural agents.</td></tr>
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<td>9</td>
<td>In the following food chain, 100J of energy is available to the lion. How much energy was available to the producer? (2017)

Ans. There are three trophic levels: the producer, the consumer and the secondary consumer according to 10% of energy transfer in the trophic level.
If the lion has 100 J of energy then
let's take 10% of x = 100 J , then x = 1000J
Thus the producer had 1000 J of energy.</td>
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<td>10</td>
<td>What are decomposers ? Write the role of decomposers in the environment ? (2016, 2017)</td>
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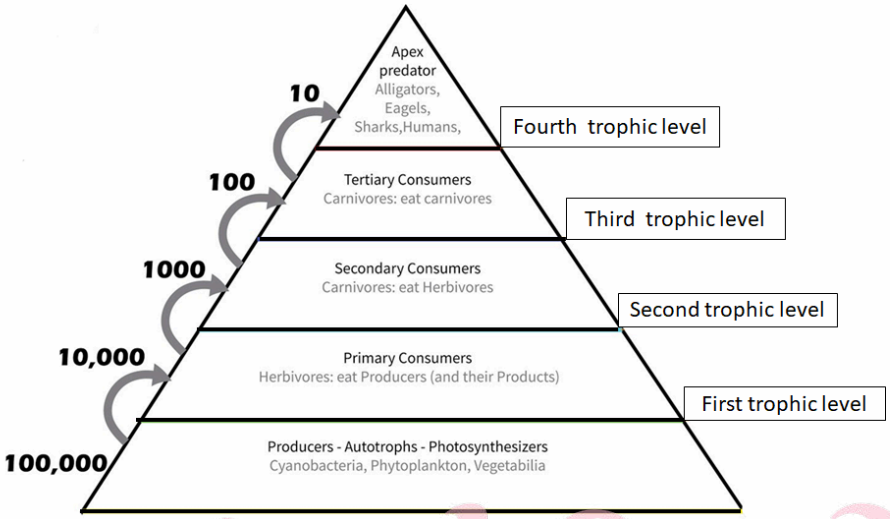
	Ans. Organisms known as decomposers are responsible for decomposing organic matter in deceased plants and animals and reintroducing it to the surrounding environment. Organisms that decompose include fungus and bacteria. Decomposers' role: 1. They release complex organic materials into the environment and aid in its recycling by disassembling it into its constituent elements, such as carbon and nitrogen. 2. Because they consume dead and decaying organisms, they stop the offensive stench from spreading from the organic matter that is decomposing.	
11	Why are green plants called the producers ?**(2019, 2015)** Ans. Producers: Because they rely only on simple inorganic compounds like carbon and water to manufacture their own food, green plants are considered producers because they not only sustain all other species but also produce their own food.	2
12	Write the full name of the group of compounds mainly responsible for the depletion of the ozone layer ? **(2018, 2021)** Ans. Chlorofluorocarbons; The synthetic chemical, chlorofluorocarbons (CFCs) containing halogen as a functional group is responsible for the depletion of ozone layer.	2
13	What is biodiversity ? What will happen if biodiversity of an area is not preserved ? Mention one of them. **(2015)** Ans The variety of living things in a given area is known as biodiversity. The loss of biodiversity in a region can result in natural disasters like floods and forest fires. It may result in habitat loss for both plants and animals, erosion of the soil, and eventually the extinction of fragile species. It may result in unstable ecosystems and changes in the climate.	3
14	What is ten percent law? Explain with an example how energy flows through different trophic levels ? **(2015)** Ans The 10 percent rule is used to approximate the independence of trials where sampling is taken without replacement. If the sample size is less than 10% of the population size, then the trials can be treated as if they are	3

	independent, even if they are not. Each step or level of the food chain where transfer of food or energy takes place is referred to as a trophic level. The energy relationship between trophic levels is shown in a form of pyramid.  Pyramid of energy	
15	Name six natural ecosystems. **(2016)** Ans The ecosystem of forests. ecosystem of grasslands. The tundra ecosystem. Ecosystem of the Desert. The ecosystem of freshwater. The marine ecosystem.	3
16	A lot of waste is generated in the neighborhood. However, almost all of it is biodegradable. What impact will it have on the environment or human health ? **(2022)** Ans Another issue would arise if all of the garbage produced was biodegradable. Wastes cannot be converted at the appropriate moment into harmless, simpler substances since there won't be many decomposers. It will turn into a fly breeding habitat where illnesses can spread.	2
17	Kulhads and disposable paper cups both are an alternative for disposable plastic cups. Which one of these two can be considered as a better alternative to plastic cups and why	3

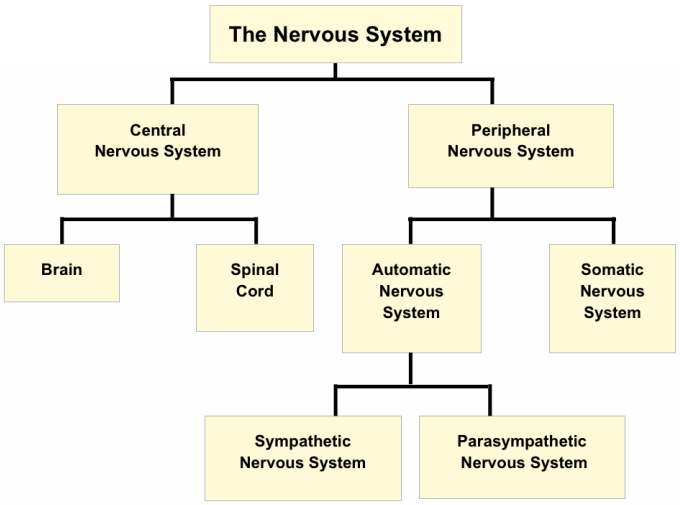
	?**(2022)** Ans Kulhad cups are considered more environmentally friendly compared to paper cups. Since they are made from natural clay, they are biodegradable and do not contribute to landfills. Additionally, the production process of kulhad cups consumes minimal energy, further reducing their carbon footprint.	
18	" Although gardens are created by man, they are considered to be ecosystems." Justify this statement **(2023)** Ans Gardens are thought of as an ecosystem even though they were developed by humans. Abiotic factors, including light, wind, water, minerals, soil, and so forth, affect their growth, procreation, and other processes. A garden is therefore viewed as an ecosystem.	3
19	We do not clean ponds or lakes, but an aquarium needs to be cleaned regularly. Explain **(2023, 2017)** Ponds and lakes being natural ecosystems have natural decomposers and cleaners embedded as an integral part of the ecosystem, hence we do not have to clean them. Aquariums are artificially built ecosystems which generally do not contain every aspect of a natural ecosystem.	2
20	How is ozone formed in the higher levels of the atmosphere? " Damage to the ozone layer is a cause of concern". Justify this statement.**(2015, 2017, 2020, 2023)** Ans When UV rays interact with oxygen molecules, they release a free oxygen atom, which then joins with another oxygen molecule to generate ozone. O + O2 → O3 (Ozone) Because ozone absorbs and shields us from the Sun's harmful UV rays, its decrease is a reason for concern.	2

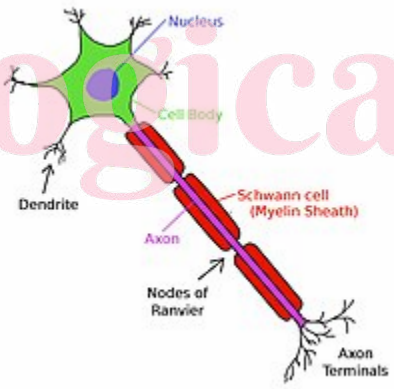
SUBJECT:
CLASS: X

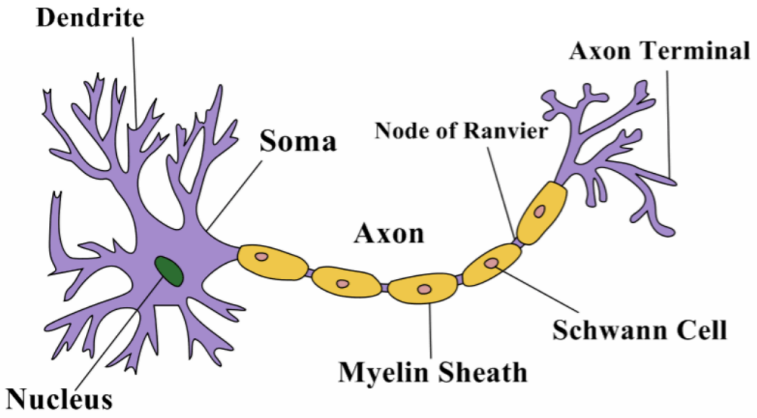
CHAPTER: Control and Coordination No. of PYQs:20

Sl No	QUESTIONS	MARK
1.	A squirrel is in a scary situation. Its body has to prepare for either fighting or running away. State the immediate changes that take place in its body so that the squirrel is able to either fight or run. **(2020)** Ans. The instantaneous physical transformation a squirrel experiences in order to run or battle 1) The amygdala responds to danger 2) The hypothalamus causes the adrenal gland to release adrenaline and triggers the sympathetic nervous system. 3) An increase in respiration and heart rate is brought on by adrenaline. 4) It also results in pupil dilation, elevated blood pressure, etc. 4) During that specific period, it inhibits the reproductive and digestive systems' functions.	3
2	How is the mode of action in beating the heart different from reflex actions ? Give four examples ?**(2023)** Ans. Involuntary actions are those which we cannot control even if we want to. There is no stimulus involved in the involuntary actions. They take place on their own. For example, our heart beats all the time without thinking about it. So, the beating of the heart is a purely involuntary action but they take place in response to a stimulus. For example, the decrease in the size of the pupil of our stepping out in bright light is a reflex action which takes place in response to a stimulus 'light'. Reflex actions are usually regulated by the spinal cord. Coughing, yawning and blinking of eyes are examples of reflex actions.	5
3	Why is chemical communication better than electrical impulses	5

	as a means of communication between cells in multicellular organisms ? **(2020)** Ans. In a multicellular organism, chemical communication is preferable to electrical impulses as a mode of communication between cells because: 1) It involves hormones; 2) It does not require specialized tissues, such as nerve tissues, for signaling to occur. 2) While chemical coordination can occur anywhere in the body, electrical communication is restricted to areas that are connected by nerves. 3) While nerve coordination can only be done sometimes, chemical communication can occur continuously and gradually.	
4	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 **(2020)** Ans. Cheetah's neurological system receives stimulation from the prey site, which causes an impulse to travel through its muscles and limbs, propelling it quickly toward the direction of the prey. Upon reception of the stimulus, the impulse is transmitted electrically and chemically along the nerve. This results in the release of substances known as neurotransmitters at the neuro-muscular junction. ocr_image The muscles changed shape in response to this substance, causing them to contract. Special proteins found in muscle cells allow them to react to electrical impulses by changing their form and arrangement. This stimulated action of the muscle cells spreads throughout the entire muscle fiber, causing it to shorten or contract.	3
5	What constitutes the central and peripheral nervous systems? How are the components of the nervous system protected ? Which signals will get disrupted in case of a spinal cord injury ? **(2017, 2020)** Ans.	5

	 Both the brain and the spinal cord are protected by bone: the brain by the bones of the skull, and the spinal cord by vertebrae , a set of ring-shaped bones. They're both cushioned by layers of membranes (called meninges) and cerebrospinal fluid. Peripheral nerves that emerge from the spinal cord communicate with the brain through the chord. Damage to the spinal cord would impair the somatic motor impulses, which are the skeletal muscles' voluntary movements, from reaching various body areas. Additionally, the spinal damage would impact the reflex activities because of its involvement in a spinal reflex arc.	
6	(a) Name the hormone secreted by (i) Pituitary , and (ii) Thyroid stating one main function of each. Name the disorder a person is likely to suffer from due to the deficiency of the above mentioned hormones. (b) How is the timing and amount of hormone released regulated ? Explain with an example **(2020)** Ans. (a) Pituitary: Located at the base of the brain, this gland is tiny, about the size of a pea. The anterior pituitary secretes human growth hormone, which promotes bodily growth and development. It aids in the body's cell healing process as well. Pituitary gland disorders include acromegaly, Cushing's syndrome, diabetes insipidus, Thyroid: Our throat region contains the thyroid gland. This gland secretes the hormone thyroxine, which is important for healthy brain growth and function.Cretinism; goiter; myxoedema are the deficiencies that occur due to the deficiency of thyroxine. Iodine	5

	is required for the synthesis of thyroxine hormone. (b) In humans, the feedback system governed by the final product controls the timing and quantity of hormone secretion. For instance, when blood sugar levels rise and the body receives a positive response, the pancreas is stimulated to secrete insulin. Insulin will store sugar as lipids and glycogen in hepatocytes and adipose tissue, respectively. The pancreas will be able to quit secreting insulin when the blood sugar level drops due to negative feedback.	
7	What is a nerve impulse? State the direction followed by a nerve impulse while traveling in the body of an organism? **(2019)** Ans. Nerve impulse - an electrical signal transmitted along a nerve fiber. This impulse travels from the dendrite to the cell body and then along the axon to its end.  	3
8	Draw a diagram of a neuron and name and label all the parts and functions ? **(2019)** Ans.	5

	 The basic building block of the neurological system is the neuron. Another name for neurons is nerve cells. Transmitting information and sending the right signals to the other bodily components is the primary job of neurons. Electrical signals are the type of signals that are received. An axon, a dendrite, and a cell body make up a neuron. Messages from the environment are taken in by dendrites and sent to the cell body. The nucleus, mitochondria, and other organelles make up the cell body. The message is sent from the cell body by the axon and is received by the subsequent receiving neuron.	
9	Why does the flow of signals in a synapse from the axonal end of one neuron to the dendritic end of another neuron take place but not in the reverse direction ? Explain. **(2019)** Ans. A neuron is traversed by an electrical impulse. However, it must be transferred in the form of neurotransmitters in order to reach another neuron. Specialized substances are known as neurotransmitters. These require certain channels to enter a neuron. Axons lack these types of receptor channels, whereas dendrites do. Neurotransmitters are released from the axonal terminals of one neuron and are subsequently received by the dendrites of the subsequent neuron. As a result, messages in a synapse move from the axonal end of one neuron to the dendritic end of another, not the other way around.	5
10	List in tabular form three distinguishing features between cerebrum and cerebellum **(2019)** Ans.	3

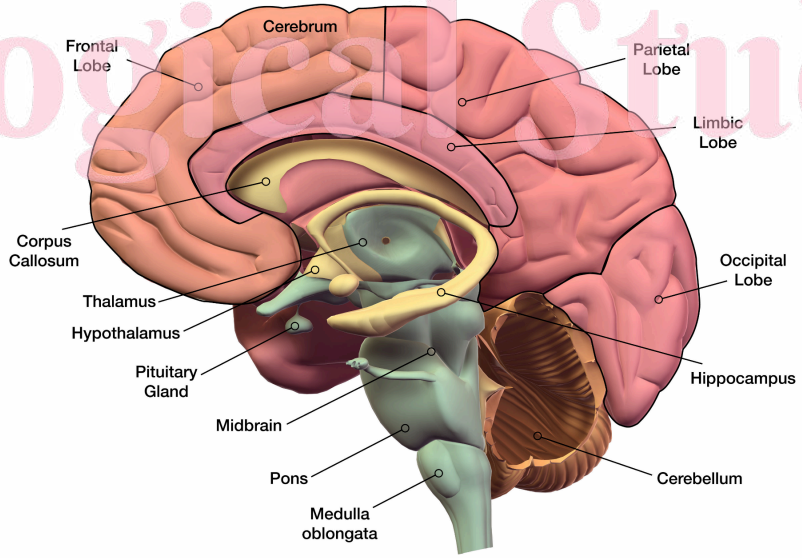
<table>
<tr><td></td><td>
<table>
<tr><th>S.No.</th><th>Cerebrum</th><th>Cerebellum</th></tr>
<tr><td>1.</td><td>It is also known as the little brain.</td><td>It is also known as the new brain.</td></tr>
<tr><td>2.</td><td>It is a part of the hindbrain.</td><td>It is a part of the forebrain.</td></tr>
<tr><td>3.</td><td>Divided into two cerebellar hemispheres joined to the brain stem.</td><td>Divided into two regions called cerebral hemispheres.</td></tr>
</table>
</td><td></td></tr>
<tr><td>11</td><td>State the function of each of the following plant hormones:
(a) Gibberellins
(b) Auxins
(c) Abscisic acid (2019)
Ans.
(a) Gibberlines - They are growth hormones which promote growth of stem

(b) Auxins - It helps plants to grow. Auxin controls the growth, development and proliferation of cells in the plant.

(c) Abscisic acid - It inhibits the growth of the plant.</td><td>3</td></tr>
<tr><td>12</td><td>(a) What are sensory and motor neurons? Write their function (2018)
(b) Different parts of the brain are associated with specific functions. Name the parts of the human brain which perform the following functions: 1. Sensation of freeing full 2. Vomiting

Ans. (a) The neuron that transmits the signal, or stimulus, from the effector organs to the central nervous system is known as a sensory neuron.
The neurons that transmit signals (responses) from the central nervous system to the effector organs are known as motor neurons.
(b) (1.) Sensation of feeling full: Hypothalamus is the part of the brain which controls the blood sugars and the intestine.
(2.) Vomiting: Medulla oblongata is the part of the brain which involves a series of contractions of smooth muscles.</td><td>4</td></tr>
<tr><td>13</td><td>Name the part of human brain which control the voluntary and</td><td>3</td></tr>
</table>

	involuntary actions **(2017, 2018)** Ans. The medulla controls the involuntary actions whereas the forebrain is responsible for controlling the voluntary actions in the body.	
14	Explain with an example how the timing and amount of hormone secreted are regulated in a human body. **(2017, 2018)** Ans. i The feedback system controls the amount and timing of hormone release. Example: When blood sugar levels rise, the pancreatic cells recognize this and increase insulin production in response. The release of insulin decreases when blood sugar levels drop.	2
15	How does the feedback mechanism regulate hormone secretion? Explain with the help of an example ? **(2017, 2019)** Ans. The system that keeps the body's and blood's hormone balance stable is known as the hormone feedback mechanism. That specific hormone's concentration can either increase or decrease, which will either encourage or hinder the hormone's secretion. We refer to this as feedback. There are two different kinds of feedback. Positive feedback is referred to as such, but negative input is not. The hormone is secreted or produced more when there is a positive feedback loop. On the other hand, the hormone's release is suppressed by the negative feedback. For instance, eating food high in carbohydrates raises blood glucose levels. The pancreas secretes insulin when blood glucose levels rise. The cells will be signaled by this insulin to start absorbing blood glucose. Therefore The blood's glucose content drops. There would be a shortage of glucose in the circulation if insulin was still present because more and more glucose would be carried inside the cell. In order to stop this, low blood glucose levels provide negative feedback, which in turn stops the blood's production of insulin.	4
16	Draw a diagram of the cross-sectional view of the human brain label the parts of the brain with the functions. **(2017, 2020)** Ans.	5

	The following are the functions of several brain regions: The medulla oblongata is responsible for regulating reflex responses and involuntary actions. Moreover, it regulates vomiting, salivation, and blood pressure. Cerebellum: It directs and synchronizes various muscle movements. It is in charge of voluntary movements and keeps the body balanced whether one is walking, drinking, catching, etc. Parts of the forebrain include the following: 1. Cerebrum: Responsible for thinking, speaking, reasoning, intelligence, and information utilization. 2. Olfactory: Lobes in this area are in charge of identifying odors from various receptors. 3. Diencephalon: Regulates body temperature, appetite, thirst, and other impulses.  	
17	With the help of suitable examples explain the terms phototropism, geotropism and chemotropism, **(2016, 2020)** Ans. 1. Phototropism: It is the direction of growth of a plant in response to the direction of the light. Eg - Movement of shoots of plants upwards towards light.	3

	2. Geotropism is the term used to describe the directional movement of growth that plants display in response to gravity. Geotropism is the growth of roots in the direction of gravity. 3. Chemotropism: The directed movement of growth in response to a chemical stimulation is known as chemotropism. When the pollen tube expands in the direction of the substance released by the ovary during pollen tube germination, this is known as chemotropism.	
18	In the absence of muscle cells, how do plant cells show movements? **(2016)** Ans. Plants exhibit either nastic movement or tropic movement when their muscle cells are absent. The plant achieves nastic movement by varying the amount of water in its cells. The nastic movement is carried out by the leaf petiole. The action of several hormones in the plants causes the tropic movement. The hormone auxin is responsible for achieving phototropism. The hormone abscisic acid causes leaves to wilt. Cytokinin is responsible for the fruits' and seeds' development.	2
19	Name a plant hormone responsible for bending of a shoot of a plant when it is exposed to unidirectional light. How does it promote phototropism ? **(2019, 2023)** Ans. Phototropism is the term for a plant's bending towards light. The hormone auxins found in plants is to blame. Auxins, which are produced at the tips of the shoots of phototropic plants, aid in the extension of the cells when the growing sections of the plant sense sunlight.	3
20	Define geotropism. Draw a labeled diagram of a plant showing geotropic movement of its parts. **(2021, 2020)** Ans. The movement of plant growth towards or against gravity is called geotropism. When the movement is towards gravity it is positive geotropism and when it is against the gravity it is negative geotropism.	3