SAMPLE QUESTION PAPER -II CLASS X (CBSE) Science - Term 2 - Full Test (2021-22)

Max. Marks: 40

Time allowed: 2 hrs

Section - A						
1	a) The structural formula of the given compounds is as follows:					1
	I	H H H H—C—C—C— H H H Propane	•Н Н—С≡С∙ Ргору	Н -С—Н Н— Н уле Су	H H C C H I I H H	
	Bonds pro	esent in propane	molecule: 10 sing \Rightarrow 10 cov	le bonds valent bonds		
	Bonds pro	esent in propyne	molecule: 5 singl $\Rightarrow 5 + 3 =$	e bonds + 1 triple = 8 covalent bond	e bond ds	
	Bonds pro	esent in cycloprop	pane molecule: 9 \Rightarrow 9 cova	single bonds		
	→ 9 covalent bonds Hence, the ascending order of compounds having the number of covalent bonds are as follows: Propyne < Cyclopropane < Propane					
	b) The series of compounds having the same functional group and differing by a $-CH_2$ unit is called a homologous series. The next homologue of propyne (C ₃ H ₄) is C ₄ H ₆ i.e. butyne.					
2	2					
	Elements	Atomic number	Electronic configuration	Period	Group	
	А	10	2, 8	2	18	
	В	14	2, 8, 4	3	14	
	С	32	2, 8, 18, 4	4	14	
	D	1	1	1	1	

3	 a) The direction of earth's magnetic field is from geographical south to geographical north and that of the current is from east to west. Therefore, by using Fleming's left hand rule, the force will be acting vertically downwards. b) Effect on force in the two cases will be: i. By reversing the direction of the current, the direction of force will also be reversed i.e, vertically upwards. Therefore, by using Fleming's left hand rule, the force will be acting vertically upwards. ii. By doubling the magnitude of current, the magnitude of the force will also be doubled. 	1
	The metallic body of electric appliances is connected to the earth using earth wire so that any leakage of electric current is transferred to the ground. This prevents any electric shock to the user. The metallic body is connected to the earth wire, which provides a low resistance conducting path for the current. Thus, it assures that the appliances' metallic body keeps its potential same as that of the earth, i.e zero, and the user may not get any severe shock.	1
4	Mendel's law of independent assortment states that the alleles of two or more different genes get sorted into gametes independently of one another. This means that the allele received for one gene does not influence the allele received for another gene. The two characteristics of the pea plant that Mendel selected for dihybrid cross are: 1. Seed shape 2. Seed colour	2
5	 Androecium: The third whorl of a flower is called the androecium. Androecium is made up of male reproductive units called stamens. They produce the male gamete called pollen grains. An androecium is usually made up of multiple stamina (plural of stamen); each is composed of two parts, the filament and the anther. 1. Filament: The long, thin stalk of a stamen. 2. Anther: The top of a stamen that produces pollen grains. Gynoecium: The innermost whorl of the flower is called the gynoecium. It contains the female reproductive units called carpels. A gynoecium may contain a single carpel, many separate carpels or many carpels that have fused together. 	1



7	 A small ecosystem usually consists of four trophic levels—producers, primary consumers, secondary consumers, and tertiary consumers. Primary consumers depend on producers and are mostly herbivores. Secondary consumers depend on primary consumers for food while organisms from tertiary consumers depend on secondary consumers. When secondary consumers become extinct, there will be an enormous increase in the population of primary consumers, leading to extinction ultimately. When primary consumers become extinct, there will be a decline in the food for secondary consumers. This leads to the extinction of secondary consumers ultimately. When producers become extinct, there will be a decline in the food for secondary consumers. This leads to the extinction of secondary consumers ultimately. 	2
	OR	
	According to the Law of energy transfer in the food chain, only 10% of energy will be transferred to the next trophic level. So the energy transfer from 1st level to 2nd level will be 700 kcal. Now the 2nd level has 700 kcal energy and only 10% of this energy will be transferred to the 3rd trophic level. So the energy transferred from the 2nd level to the 3rd level will be 70 kcal. A lot of the energy is lost as heat to the environment. Some amount of energy goes into doing work and the rest goes into growth and reproduction.	2
	SECTION B	
8	 a) Potassium (K) has the most metallic character in the table. Down the group, the atomic size increases due to the addition of a shell, hence the valence electron gets farther from the nucleus, experiencing lesser attraction from the nucleus. This makes it easy to lose electrons. Hence the metallic character increases down the group. Along a period, the atomic size decreases, hence the valence electrons get closer to the nucleus as they experience greater attraction from the nucleus due to increased nuclear charge. Hence the metallic character decreases across the period. b) Atomic size increases as the number of shells increase successively down a group. So the increasing order of the atomic size of group 14 elements would 	1

	c)	c) Electron(s) present in the outermost shell of an atom are known as valence		
		electron(s).		
		Electronic configuration of Mg: 2, 8, 2 Therefore, number of valence electrons in Mg = 2		
		Electronic configuration of Ne: 2, 8		
		Therefore, number of valence electrons in $Ne = 8$		
9	a)			
		Alkanes Alkenes	11/2	
		 These are compounds that contain single bonds only. These are compounds that contain one or more double bonds. 	1/2	
		• They are saturated • They are unsaturated		
		 hydrocarbons. Their general formula is hydrocarbons. Their general formula is 		
		C_nH_{2n+2} . C_nH_{2n} .		
		• Example: Methane (CH_4) • Example: Ethene (C_2H_4)		
	b)	C_2H_2 and C_3H_6 are the two molecules with triple bonds in them. Their	11/2	
		respective names are ethyne and propyne.		
		OR,		
	a)	Lewis dot structure for X (C_3H_6O):		
		$H \bullet C \bullet C \bullet C \bullet C \bullet H$ $H \bullet C \bullet C \bullet C \bullet C \bullet H$ $H \bullet H$ $H \bullet H$	11/2	
		Lewis dot structure for Y ($C_2H_4O_2$):		
		н Ю Н••С••С••О••Н	11/	
		н	1 1/2	

	b)	The functional groups present in X and Y are ketone (C=O) and carboxylic (COOH) respectively.	
10	a)	The human reproductive organ that produces sperms and also secrete hormones is testes.	1/2
		The hormone testosterone is responsible for the development of male secondary sexual characters such as facial hair, development of muscles and bone mass.	1/2
	b)	i) Fertilisation takes place in the oviduct/fallopian tube.	1/2
		ii) Implantation of the fertilised egg takes place in the uterus .	1/2
	c)	Embryo takes its nourishment from a special disc-shaped tissue embedded in the uterine wall of the mother. It is through this tissue that the nutrients and waste materials are exchanged between mother and foetus. This tissue is known as placenta .	1
		OR,	
	a)	(ii) Oviduct/fallopian tube (j) Ovary	¹ / ₂ x2=1
	b) c)	Two bacterial diseases which are transmitted sexually are gonorrhoea, syphilis Chemicals or materials required to prevent conception (pregnancy) are called contraceptive devices. Contraceptive devices are mainly adopted because of the following reasons. (i) To control human population or birth rate (ii) To prevent unwanted pregnancies (iii) To prevent STD's	1 1/2 1/2

11	a) Principle of electric motor: An electric motor works on the principle that when a rectangular metallic coil is placed in a magnetic field and a current is	1
	passed through it, a force acts on the coil which rotates it continuously.	
	Hence, the electrical energy is converted into mechanical energy.	
	b) <u>Role of a split ring in electric motor</u>: Split ring is used for reversing the direction of current in the coil. For continuous rotation of the coil in the same	1
	direction of current in the coil must be reversed. Therefore, after every half	1
	rotation of the coil the direction of the force rotating the coil remains the	
	same and the coil continues its rotation in the same direction.	
	c) <u>Increasing the strength of current</u>	
	i Increasing the number of turns in the coil	1
10		
12	Given: Diameter of the wire (D) = $1.4 \text{ mm} = 1.4 \times 10^{-3} \text{ m}$. Resistivity of the material	
	(o) = 2.2 x 10 ⁻⁶ Ω cm = 2.2 x 10 ⁻⁸ ohm m : Resistance (R) = 10 Ω	
	Let 'L' be the length and 'A' be the area of the required wire, then	
	Area of cross-section of the wire = $\pi D^2/4 = \pi (1.4 \times 10^{-3})^2/4$	
	Since $R = \rho L/A$	
	$\Rightarrow 10 = (2.2 \text{ x } 10^{-8} \text{ x } \text{L}) / (\pi \text{D}^2/4) = (2.2 \text{ x } 10^{-8} \text{ x } \text{L}) / (\pi (1.4 \text{ x } 10^{-3})^2/4)$	1
	\Rightarrow L = 700 m	
	We know that, $\mathbf{D} = \mathbf{L} / \mathbf{A}$ and	
	$\mathbf{R} = \rho \mathbf{L} / \mathbf{A} \text{and,} \\ \mathbf{A} = \sigma \mathbf{D}^2 / \mathbf{A}$	1
	$A - \pi D / 4$	
	On doubling the diameter, the area would become 4 times (Since A \propto d ²)	1
	Hence, the new resistance would be	1
	$R' = \rho L/4A$	
	$R' = R/4 = 10/4 = 2.5 \Omega$	
	OR,	
	20	
	5Ω	
	↑	

	a) b)	Since the three resistors are in parallel, hence, the voltage across each of them will be = 6 V Hence, The current through 2 Ω resistor = I ₁ = V / R ₁ = 6 / 2 = 3 A Similarly, The current through 5 Ω resistor = I ₂ = V / R ₂ = 6 / 5 = 1.2 A Similarly, The current through 10 Ω resistor = I ₁ = V / R ₃ = 6 / 10 = 0.6 A Total current in the circuit will be = I = I ₁ + I ₂ + I ₃ = 3 + 1.2 + 0.6 = 4.8 A	1		
	c)	Since the three resistors are in parallel, hence, total resistance of the circuit (R) will be, $1/R = 1/R_1 + 1/R_2 + 1/R_3 = 1/2 + 1/5 + 1/10 = 4/5$ $R = 5/4 = 1.25 \Omega$	1		
13	a)	The ozone layer in the stratosphere is the product of UV radiation acting on oxygen molecules. UV rays break the molecular O_2 into free O atoms. The free O atoms combine with molecular O_2 to form O_3 . The resultant O_3 is thermodynamically unstable and decomposes into molecular O_2 and free O atoms. Again the free oxygen atom combines to form ozone. This way there remains the balance between the production and decomposition of O_3 . UV rays + $O_2 \rightarrow O + O$ O + $O_2 \rightarrow O_3$ O ₃ $\rightarrow O + O_2$ When the CFCs (chlorofluorocarbons) rise up in the air, UV rays break them to free chlorine atoms. The free chlorine atom reacts with O_3 to give back molecular O_2 and chlorine monoxide (CIO). CIO further reacts with free O atoms to give more free Cl atoms and this process, again and again, goes on and destroys the ozone molecules. So a single free chlorine atom can decompose a huge amount of ozone molecules CFC + UV rays \rightarrow Cl + CFCl ₂ O ₃ + Cl \rightarrow ClO + O ₂	2		
	b)	CFCs are released into our atmosphere due to the use of refrigerators, air conditions, aerosols, and more containing CFCs, so by reducing the use of these kinds of products can help to prevent the depletion of the ozone layer.	1		
	SECTION C				



ii) Yellow and round were the dominant characters. Green and wrinkled were	1
the recessive characters. In heterozygous conditions(YyRr) due to the	
presence of the dominant allele(Y and R) only the dominant traits were	
expressed in the F1 generation. Recessive traits were not expressed in the F1	
generation. Hence, all the plants were yellow round.	
iii) The scientific name of the plant which Mendel used for his experiment	
is Pisum sativum	1
Mendel chose the Pisum sativum for his experiments because of the following	
features:	
• Easy to grow	
• Shorter maturation period and short lifespan.	
Easily distinguishable characteristics	
(Note: Any one reason can be written)	