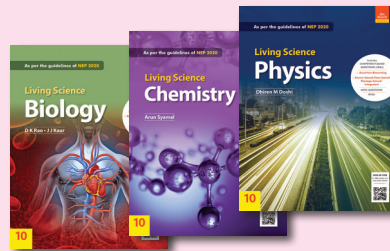


Sample Question Paper

(TERM-II) 2021-22



Class X SCIENCE (086)

ANSWERS

SECTION – A

1. a. iv.
b. Carbon forms large number of compounds because of tetravalency and catenation.
2. a. Element C
b. Element B
3. a. Yeast and *Hydra* ($\frac{1}{2}$ + $\frac{1}{2}$ mark)
b. i. Vegetative propagation by stem- Tuber of potato ($\frac{1}{2}$ mark)
ii. Vegetative propagation by leaf- *Bryophyllum* ($\frac{1}{2}$ mark)
4. a. Testes are extra abdominal in human male because sperm needs temperature 2–3 °C lower than body temperature to mature. (1 mark)
b. Seminal vesicles and prostate gland of human male reproductive system contribute fluid to the semen. (1 mark)
5. The genotype of the violet-coloured flower bearing parent plant must be Ww (heterozygous). (1 mark)
This type of cross is named as test cross where a plant with dominant character of unknown genotype is crossed with homozygous recessive one. (1 mark)

OR

Organisms that support common ancestry show similar biochemical reactions. Four biochemical evidences are:

- i. Similar chemical nature and similar functions of enzymes and hormones of different vertebrates ($\frac{1}{2}$ mark)
 - ii. Similar composition of blood and lymph ($\frac{1}{2}$ mark)
 - iii. Similarities between blood proteins ($\frac{1}{2}$ mark)
 - iv. Biochemical recapitulation ($\frac{1}{2}$ mark)
6. a. When current is flowing steadily in coil A, the galvanometer shows no deflection.
b. When coil A is disconnected from the battery, the pointer of the galvanometer jumps to the side opposite to the side and then returns to zero.

OR

Applying the right-hand thumb rule, we can see that the magnetic field at P is directed into the plane of the paper while the field at Q is directed outward from the plane of the paper. Since the strength of magnetic field is inversely proportional to distance, if $r_1 > r_2$, the field strength at Q is larger than that at P.

7. A food chain having three organisms (food chain A) will be more efficient than the food chain having five organisms (food chain B) in terms of energy to top carnivores. With each trophic level, the amount of available energy goes on decreasing because of 10% of energy will be transferred to the next trophic level. The lesser the trophic levels, the more will be the energy available to the next level. (2 marks)

OR

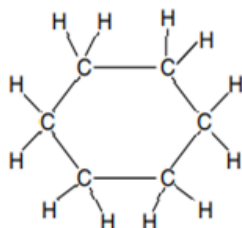
If the frog has 30 J of energy, grass must have 3000 J of energy initially. This is because the frog must have obtained only 10% of energy from insect which must have obtained 300 J of energy from grass (10% of energy possessed by plants). Hence the grass must have had 3000 J of energy. (1 mark)

In this case, snake will have 3 J of energy. (1 mark)

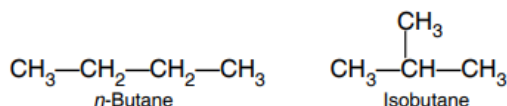
8. a. The valency of group 1 elements is 1. Hence, the formula of their oxides should be M_2O , where M refers to group 1 elements.
b. The valency of group 13 elements is 3. Since the valency of halogens is 1, therefore, the formula of their halides should be EX_3 , where E refers to group 13 elements and X refers to halogens.
c. The valencies of group 2 and group 16 elements are 2. So, when the elements of these two groups combine, they form compounds of the type AB . Here, A refers to elements of group 2 and B refers to elements of group 16.
9. a. The atomic number of carbon is six and it can either gain four electrons or lose four electrons to complete its octet. The electron attracting property of carbon atom is neither too low nor too high. This indicates that carbon has no tendency to lose or gain electrons. In order to complete its octet, it undergoes mutual sharing of electrons to form covalent bonds with other elements rather than forming bonds by transfer of free electrons.
b. i. Covalent compounds are bad conductors of heat and electricity. This is because during the formation of covalent bonds, electrons are only shared between the atoms and no charged particles are formed.
ii. Covalent compounds have low melting and boiling points because they possess weak intermolecular forces. So, less amount of energy is required to break the bonds between them.

OR

- a. It is cyclohexane and the total number of covalent bonds in it are 18.



- b. The structures of isomers of butane are as follows:



10. a. All the plants of F_1 generation are tall (phenotype). (½ mark)

The genotype of the F_1 generation is Tt (½ mark)

b. Dwarf plants are not found in F_1 generation but appeared in F_2 generation. Both tallness and dwarfness genes are inherited in F_1 generation. Tallness gene being dominant over dwarfness gene is expressed in F_1 generation. When self-pollination of F_1 plants were done, both tall and dwarf plants were obtained in 3 : 1 ratio in F_2 generation. The trait of dwarfness was suppressed by the tallness trait in F_1 generation. Dwarfness trait is recessive trait. It remains hidden in the presence of a dominant trait. It can be expressed only in homozygous condition in the F_2 generation. (2 marks)

11. a. We know that Power = $V \times I$

or
$$I = \frac{\text{Power}}{V}$$
$$= \frac{110 \text{ W}}{220 \text{ V}}$$
$$= 0.45 \text{ A}$$

b. Current drawn (I) = 5 A

$$\text{Time } (t) = 5 \text{ min} = 5 \times 60 \text{ s} = 300 \text{ s}$$

$$\text{Resistance } (R) = 80 \text{ W}$$

Energy drawn (H) = ?

$$H = I^2 R t$$

$$H = (5)^2 \times 80 \times 5 = 25 \times 80 \times 300$$

$$= 600000 \text{ J} = 600 \text{ kJ}$$

12. $R_1 + R_2 = 16$

or $R_1 = 16 - R_2$

$$\frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{3}$$

Or $\frac{1}{16 - R_2} + \frac{1}{R_2} = \frac{1}{3}$

or $R_2 = 12 \text{ } \Omega \text{ or } 4 \text{ } \Omega$

Therefore, $R_1 = 4 \text{ } \Omega \text{ or } 12 \text{ } \Omega$

OR

If the net resistance of the circuit is R , we have

$$\frac{1}{R} = \frac{1}{2} + \frac{1}{4}$$

or $R = \frac{4}{3} \text{ } \Omega$

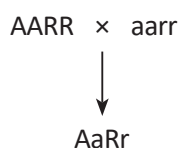
Therefore, $I = \frac{V}{R} = \frac{4 \text{ V}}{\left(\frac{4}{3} \text{ } \Omega\right)} = 3 \text{ A}$

Total current in the circuit is 3 A

$$I_1 = \frac{3 \text{ A}}{\left(\frac{2 \times 3}{4}\right)} = 2 \text{ A}$$

$$I_2 = \frac{3 \text{ A}}{\left(\frac{4 \times 3}{4}\right)} = 1 \text{ A}$$

13. a. Ozone forms a layer in the upper atmosphere. It shields the surface of the earth from ultra violet radiation (UV) coming from sun as these radiations are very harmful to us.
- b. ODS are ozone depleting substances.
Ozone depleting substances like, chlorofluorocarbon are synthetic, harmful chemicals which are used in refrigerators and air conditioners as coolants, in aerosol sprayers, etc. Once released in the air, these harmful chemicals produce active chlorine (Cl and ClO radicals) in the presence of UV radiations. These radicals, through chain reactions, then destroy the ozone layers (O_3) by converting it into oxygen (O_2). Due to this, the ozone layer in the stratosphere becomes thinner.
14. a. Sweet pea plants having axial flowers with round seeds (AARR) and terminal flowers with wrinkled seeds (aarr) are crossed



- So, the phenotype of F_1 progeny is Axial flowers with round seeds (1 mark)
- b. The phenotypic ratio in F_2 generation of this dihybrid cross is 9 : 3 : 3 : 1 (1 mark)
- c. The type of phenotypes produced in F_2
- Axial flower with round seed = 9
Axial flower with wrinkled seed = 3
Terminal flower with round seed = 3
Terminal flower with wrinkled seed = 1 (2 marks)

OR

Law of independent assortment.

It states that, when a dihybrid organism forms gametes,

- i. each gamete receives one allele from each allelic pair (or each characteristic), and
 - ii. the assortment of alleles of different characteristics during gamete formation is independent of their parental combinations (2 marks)
15. a. When magnet is pushed near a bar magnet then it induces current due to electromagnetic induction. The galvanometer shows deflection which indicates the presence of current in solenoid.
- b. When the bar magnet is withdrawn from inside the coil of the insulated copper wire again, the current is induced in the coil but this time it is in reverse direction. The galvanometer shows deflection but in the opposite direction compared to when the magnet is moved towards the solenoid.
- c. When a bar magnet is held stationary inside the coil then no current is induced that's why galvanometer will show no deflection. The deflection in the galvanometer becomes zero.

OR

Electromagnetic induction. Generator and transformer