Case Based Questions

Solution 1

(i) The given elements belong to group 15 and we know that atomic radii of elements increases on moving down the group.
Hence, the correct answer is option B.
(ii) Fluorine has atomic number 9 and has electronic configuration 2,7. Therefore, it has 7 valence electrons and belongs to group 17. It needs one electron to complete its octet, so its valency is one.
Hence, the correct answer is A.
(iii) The atomic number i.e. number of protons increases by one unit on moving left to right in a period while the number of shells remains the same. The increase in atomic number increases nuclear charge and attracts the outermost shell towards the nucleus, thereby decreasing atomic size.
Hence, the correct answer is option A.
(iv) Both O and Se belong to group 16 and have a valency of two.
Hence, the correct answer is option B.
(v) Oxygen is the first element of group 16 and as we move down the group, atomic size increases. So, oxygen should have the smallest atomic size and not largest among all elements of group 16.
Hence, the correct answer is option B.

Solution 2

(i) Iron is more reactive than copper and therefore displaces copper from $CuSO_4$ solution. As a result, $FeSO_4$ is formed in solution and the colour of solution changes from blue to pale green.
Hence, the correct answer is option D.
(ii) The metal which displaces another metal from its salt solution is more reactive. Therefore, metal A is most reactive followed by metal B and metal C is least reactive.
Hence, the correct answer is option C.
(iii) Potassium is a highly reactive metal which catches fire if kept in open. Therefore, it is kept immersed in kerosene oil.
Hence, the correct answer is option C.
(iv) Magnesium (Mg) is more reactive than iron and therefore can displace it from its salt solution.
Hence, the correct answer is option A.
(v) Copper (Cu) is the least reactive metal among the given metals and therefore can be displaced from its salt solution by other three metals.
Hence, the correct answer is option C.

Solution 3

(i) Neutron is uncharged so it does not experience any force. Hence, option (a) is the correct answer.

(ii) The magnetic force is independent of the mass of the charged particle. Hence, the correct answer is option (a).

(iii) The mass and the kinetic energy of the charge remains unchanged as it moves in a magnetic field region. Thus, option (d) is the correct answer.

(iv) The particle is deflected upwards. Thus option (d) is the correct answer.

(v) Thumb denotes the direction of the Force. Thus, option (a) is the correct answer.

Solution 4

(i) Electric iron uses the heating effect of electric current. Hence, the correct answer is option (a).

(ii) Current $I = \frac{P}{V} = \frac{1100}{220} = 5\ A$. Hence, the correct answer is option (a).

(iii) Resistance R can be calculated using the formula

$$P = VI = I^2R$$
$$R = \frac{P}{I^2} = \frac{1250}{5^2} = \frac{1250}{25} = 50\Omega$$

Hence, the correct answer is option (a).

(iv) The Power rating is directly proportional to the resistance if the current flowing in the wire is kept constant.

mathematically, $P = VI\ =\ I^2R$

If resistance is doubled then the power rating is also doubled. Hence, the correct answer is option (b).

(v) Resistivity is dependent on the nature of the material of the wire. If the length of the wire increases then resistivity remains unaffected. Hence, the correct answer is option (c).

Solution 5

(i) If parallel rays are incident on the spherical mirror then the image would be formed at the center of curvature of the spherical mirror. hence the correct answer is option (a).

(ii) The magnified image of the object is formed when the object is placed between the pole and the focus of the mirror. Hence option (c) is the correct answer.

(iii) The image of the object placed at the focus is formed at infinity. Thus option (c) is the correct answer

(iv) If the object is placed at the center of curvature then the image would also form at the Center of curvature. Thus option (a) is the correct answer.

(v)IA plane mirror has no power thus no magnification of the image is possible. Moreover the image distance is equal to the object distance which means that the height of the object is same that of the object i.e. 6ft. Thus option (a) is the correct answer.