Case Based Questions

Q.No.1:
Read the following and answer any four questions from (i) to (v).
Valency
The valency of an element is determined by the number of valence electrons present in the outermost shell of its atom. It remains the same within a group and increases up to 4 and then decreases from left to right across the period.
Atomic size
The term atomic size refers to the radius of an atom. It is the distance from the center of the nucleus to the outermost shell of an atom. On moving down the group the atomic radii of elements increase while across the period the atomic radii decrease.

(i) Which of the following options depict the correct increasing order of atomic radii of elements?
(a) P < N < As < Sb
(b) N < P < As < Sb
(c) N < Sb < As < P
(d) Sb < As < P < N

(ii) Which of the following statements is correct about Fluorine?
(a) Fluorine has valency of one.
(b) Fluorine belongs to group 7.
(c) Fluorine has one valence electron.
(d) Fluorine needs seven electrons to complete its octet.

(iii) On moving left to right in a period, atomic size decreases due to:
(a) Increase in nuclear charge.
(b) Decrease in nuclear charge.
(c) Increase in number of shells.
(d) Decrease in number of shells.

(iv) Which pair of elements has the same valency?
(a) K, Ca
(b) O, Se
(c) Si, Rb
(d) Ne, Mg

(v) Which of the following statement is incorrect?

(a) The atomic radius of beryllium is smaller than that of barium.
(b) Oxygen has the largest atomic size among all elements of group 16.
(c) An element with atomic number six has greater atomic size than an element with atomic number seven.
(d) An element X present in the third period and fourteenth group has smaller atomic size than an element Y present in the fourth period and first group.

Q.No.2:
Read the following and answer any four questions from (i) to (v).
Reactivity series
We know that all metals are not equally reactive. The reactivity series is a list of metals arranged in the order of their decreasing activities. More reactive metals can displace less reactive metals from their compounds in solution or molten form.
(i) What happens when an iron strip is dipped in $CuSO_4$ solution?
(a) No reaction.
(b) A complex of iron and $CuSO_4$ is formed.
(c) Iron strip is coated with a layer of $FeSO_4$.
(d) The solution changes its colour from blue to pale green.

(ii) Metal A displaces metal B from its salt solution and metal C is displaced by metal B from the salt solution of metal C. Select the option with the correct order of reactivities of three metals.
(a) B > C > A
(b) A > C > B
(c) A > B > C
(d) C > B > A

(iii) Choose the correct statement.
(a) Gold is the most reactive metal.
(b) Magnesium is more reactive than sodium.
(c) Potassium is kept immersed in kerosene oil.
(d) Iron is present at the bottom of the reactivity series.

(iv) Which among the following can displace iron from its salt solution?
(a) Mg
(b) Pb
(c) Hg
(d) Cu

(v) Which among the following metals would be displaced from its salt solution by other three metals?
(a) Pb
(b) Zn
(c) Cu
(d) Na

Q.No.3: Read the following and answer any four questions from (i) to (v).
An MRI machine is used to diagnose and detect brain tumors or any kind of traumatic injury inside the human brain. An MRI machine uses two large magnets that produce a strong and uniform magnetic field. During an MRI scan

patients as well as any of the staff is advised not to carry any metallic instrument.

(i) Which of the following particle does not experience a force in the magnetic field if each of them is moving with the same velocity?
(a) Only Neutron
(b) Only Proton
(c) Only electron
(d) Alpha particle
(ii) The magnitude of the force experienced by a proton does not depends only
(a) Mass of the proton
(b) Charge of the proton
(c) The velocity of the proton
(d) None of the above
(iii) The quantity that does not change when the charged particle moves in a uniform magnetic field region
(a) Mass
(b) Kinetic Energy
(c) Speed
(d) Both (a) and (b)
(iv) A negatively charged particle projected towards the west is deflected South by a magnetic field. The direction of the magnetic field is.
(a) Towards North
(b) Towards East
(c) Downward
(d) Upward
(v) Fleming's left hand is used to determine the direction of the force on a current-carrying conductor. Which of the following option is correct?
(a) Thumb denotes the direction of the force
(b) Index finger denotes the direction of the force
(c) Thumb denotes the direction of electric current
(d) Thumb denotes the direction of the velocity of the charged particle

Q.No.4: Read the following and answer any four questions from (i) to (v).
The heating effect of current has many applications in daily life. The appliances that use this effect have some kind of heating element that heats up due to the current. It basically converts electrical energy into thermal energy. The resistor used in the appliance plays a vital role in generating heat due to the current. The various appliances are electrical iron, filament bulbs, coiled heaters etc.
(i) What effect of electric current do the electric iron use?
(a) Heating effect
(b) Lightning effect
(c) Optical effect
(d) None of the above
(ii) An electric iron has a rating of 1100 Watts. The amount of current drawn by it. When operated at a voltage of 220 Volts is.

(a) 5 Amperes
(b) 10 Amperes
(c) 0.5 Amperes
(d) 50 Amperes

(iii) The Resistance of the nichrome wire used in an electric iron which draws a current of 5 Amperes having a power rating of 1250 Watts.

(a) 50 Ohms
(b) 5 Ohms
(c) 10 Ohms
(d) 100 Ohms

(iv) If the resistance of the nichrome wire used in an electric iron increases by a factor of 2, with electric current having a constant value then the change in the power rating would be

(a) It would remain unchanged
(b) It would be twice its original value
(c) It would decrease by a factor of 4.
(d) It would be one-fourth of its original value

(v) The quantity that remains unaffected by the increase of the length of the nichrome wire.

(a) Volume of the wire
(b) Resistance of the wire
(c) Resistivity of the wire
(d) None of the above

Q.No.5: Read the following and answer any four questions from (i) to (v).

Ravi visited the science museum where he saw a set of mirrors when he looked into it, He saw himself as a giant Ravi. He wondered how this is happening. In another mirror, he saw himself as a thin guy. He noticed the difference in the physique of his image and himself. The reason being for his disfigured physique in the mirror being that the mirrors used in the museum were not the ordinary mirrors.

(i) If a set of parallel rays are reflected from the surface of a spherical mirror where would the point-size image formed

(a) At the focus
(b) At the center of curvature
(c) At infinity
(d) None of the above.

(ii) A magnified image of the object is formed in the case of the concave mirror. The location of the object would be

(a) Beyond the center of curvature
(b) At the center of curvature
(c) Between the focus and the pole of the mirror
(d) None of the above

(iii) When the object is kept at the focus of the mirror of any kind the image would form

(a) At Center of Curvature of the mirror
(b) At the focus
(c) At Infinity
(d) None of the above

(iv) What could be the possible position of the image if the object is placed at the center of curvature of a concave mirror

(a) Center of Curvature
(b) Principal Focus
(c) Anywhere between the pole and the Principal Focus
(d) None of the above

(v) What is the estimated height of a person if the image of a person has a height of 6 ft in case of a plane mirror?

(a) 6 ft.
(b) 7 ft.
(c) 12 ft.
(d) 3 ft.