Tenth class Physical Science Model paper

Physical science

(Max.Marks:50) [Time:2.45 Hrs.]

SECTION-I

Note:i. Answer all the questions in one word or sentence.
ii. Each question carries ½ mark

12 × ½ = 6m

1. Write the lens formula.
2. Define Dispersion.
3. Electron configuration of an atom is 2, 8, 7 to which of the following elements would it be chemically similar.
a) Nitrogen (Z=7)
b) Fluorine (Z=9)
c) Phosphorous (Z=15)
d) Argon (Z=18)
4. What is the shape of $BeCl_2$ molecule.
5. The resultant resistance of series of combination of 12Ω, 6Ω.
6. Choose the suitable answer of section B with section A

Section-A	Section-B
Material Medium	Refractive index.
i. Water	a) 2.42
ii. diamond	b) 1.50
	c) 1.33

7. Magnetic field lines leave the .....pole of a bar magnet and enter at its..... pole
8. The refractive index of glass is 1.5 then what is the speed of light in glass.
9. What is the effect of pressure on melting point of ice.
10. p^H scale is given below

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Which of the following statements is (are) true.
a. Uric Acid represents 9 on this scale.
b. Pure water represents 7 on this scale.
11. Name two metals other than aluminium which are obtained by electrolytic reduction.
12. Give one example for straight chain compound.

SECTION-II

Note: i) Answer all the questions.
ii) Each question carries 1 mark.

8 × 1 = 8

13. Convert 42°C into Kelvin scale.
14. What are the conditions required for total internal reflection.
15. Identify the part of human eye where image of an object is formed.
16. What are lanthanides?
17. Expand VSEPRT?
18. Which allotropic form of carbon has foot ball like structure.
19. What is induced current.
20. Mention two methods which produce very pure metals.

SECTION-III

Note:i. Answer all questions.
ii. Each question carries 2 marks.

8 × 2= 16 m

21. Explain the difference between the valence electron and the covalency of an element.
22. Frame some questions to know about the properties of convex lens and concave lens.
23. Which rule is violated in the electronic configuration $1s^0 2s^2 2p^4$?
24. Mention any two precautions you have taken while doing the activity to observe the reaction of acids with metals.
25. Why does the sun appear reddish early in the morning.
26. Two bulbs having rating 100w, 220v and 60w, 220v which one has the greatest resistance.
27. Write the applications of total internal reflection.
28. How do you appreciate the role of esters in everyday life

SECTION-IV

Note:i. Answer all questions
ii. Each question carries 4 marks
iii. There is a internal choice for each question?

5 × 4 = 20 m

29. a) Explain Thermal equilibrium with an activity.
(or)
b) Explain the working of electric motor with a neat diagram.
30. a) What is meant by water of crystallization of a substance? Describe an activity to show the water of crystallization.
b) Write the postulates and limitations of Neils Bohr atomic model.
31. a) How do you verify experimentally that the focal Length of a convex lens in increased when it is kept in water.
(or)
b) State Ohm's Law? Suggest an experiment to verify it and explain the procedure.
32. a) Given below is the electronic configuration of element A, B, C, D
a) $1s^2 2s^2$
b) $1s^2 2s^2 2p^6 3s^2$
c) $1s^2 2s^2 2p^6 3s^2 3p^3$ d) $1s^2 2s^2 2p^6$
1) Which are the elements coming with in the same period.
2) Which are the ones coming with in the same group.
3) Which are the noble gas elements.
4) To which group and period does the elements 'c' belong.
(or)
b) Complete the following table.

Functional group	Structural formula	Example	Suffix
Alcohol	R-OH	--	-Ol
Ether		CH_3OCH_3	--
Ester	R-COO-R		Oate
Amine		CH_3-NH_2	--
Aldehyde	R-CHO	--	--

33. a) Draw the ray diagrams for the following positions and explain the nature and position of image.
i) Object is placed at C_2
ii) Object is placed between F_2 and optic centre p.
(or)
b) Draw diagram showing magnetic separation and labeled it parts.

ANSWERS

SECTION-I

1. Lens formula
$\frac{1}{f}=\frac{1}{v}-\frac{1}{u}$

2. The splitting of white Light into colours is called dispersion.

3. b) Fluorine (Z=9)

4. Linear

5. $R=R_1+R_2$
$\therefore R_1= 12\Omega \quad R_2=6\Omega$
$R=12+6=18\Omega$

6. i-c, ii-a

7. North, south

8. Refractive index $n=\frac{c}{v}$

$1.5 or \frac{3}{2}=\frac{3\times10^8}{v} m/\sec$

$3v=3\times2\times10^8 m/\sec$

$v=2\times10^8 m/\sec$

9. With increase in pressure the melting point of ice reduce.

10. a. False
b. True

11. sodium and magnesium

12. CH_3-CH_2-CH_2-CH_2-CH_3 (n-Pentane)

SECTION-II

13. K = 273 + c°
= 273 + 42 = 315°C

14. 1. Light must travel from denser to rarer medium.
2. incident angle must be greater than critical angle.

15. Retina

16. Elements from the atomic number cerium ($_{58}$Ce) to Luthetium ($_{71}$Lu) are called lanthanides

17. Valency Shell Electron Pair Repulsion Theory.

18. Buck minister fullerene

19. The current produced by moving a straight line in a magnetic field is called induced current.

20. Electrolytic reduction, smelting are two methods which produce very pure metals.

SECTION-III

21. 1. The number electrons present in the outermost orbital of an atom are called valence electrons.
2. Valence electrons depends upon the number of electrons present in that atom.

covalency:

1. The total number of covalent bonds that an atom of an element forms is called covalency of the element.
2. covalency depend upon the valence electrons.

22. 1) If the convex lens in water its focal length is?
2) What is the power of concave lens?

23. Aufbau principle is violated in the electronic configuration $1s^0 2s^2 2p^4$
Electrons are assigned to orbitals in order of increasing value of (n+*l*)
Hence (n+*l*) value of 1s=1+0=1
(n+*l*) value 2s = 2+0 = 2
So electrons are first filled in 1s orbital. But in the above configuration electron filled in 2s orbital without filled in 1s orbital.

24. i) Pour the acid (Hcl) into the test tube along the side of the wall.
ii) Add zinc granules gently to the acid
iii) Keep the delivery tube inside the soap water before keeping the one hold rubber cork to the test tube.

25. It is due to scattering of light. Light near the horizons passes thicker layers of air and larger distance of atmosphere.
Hence most of the blue light is scattered away and longer wave length reach our eyes giving rise to reddish colour of Sun.

26. We know that power $(p)=\frac{v^2}{R}$

Given

Ist bulb	IInd bulb
p=100w	p=60w
v= 220v	v=220v

$p=\frac{v^2}{R_2}$ $p=\frac{v^2}{R_1}$

$R_1=\frac{v^2}{p}=\frac{220\times220}{100}$ $R_2=\frac{220\times220}{60}$

$R_2=\frac{2420}{3}=806.66\Omega$

R_1= 484Ω
$\therefore$ Second bulb has greatest resistance.

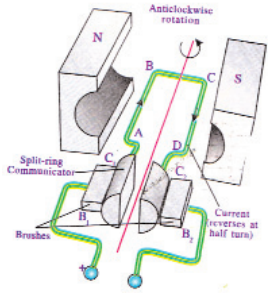
27. Applications of total internal reflection:
1) Formation of mirage
2) Brilliance of diamond
3) Optical fibre

28. 1. Esters are useful to us in many ways in everyday life.
2. Esters are sweet smelling substances.
3. There are used in making perfumes and flavouring agents.
4. Esters reacts with acids or bases to give alcohol and carboxylic acids.
5. Esters are used in saponification to prepare soaps.
Hence, appreciate the role of esters in everyday life.

SECTION-IV

29. (a) i) Take two cups and fill one of them with hot water and another with cold water.
ii) Take a Laboratory thermometer observe the mercury level and note down the reading.
iii) Keep the thermometer in hot Water, you observe that there is a rise in mercury level.
iv) This happens because heat got transferred from the hotter body (hot water) to the colder body (mercury in thermometer)
v) Now place the thermometer in cold water and observe changes in the mercury level. You will observe that the mercury level comes down to its initial level.
vi) This happens because of transfer of heat from mercury (hotter body) to water (colder body)
vii) The steadiness of the mercury column of the thermometer indicator that flow of heat between the thermometer liquid (mercury) and water has stopped that means thermal equilibrium has been attained between water and mercury.

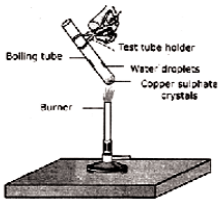
(**b**) **Electric motor:** A Motor is a device which converts electric energy into mechanical enegy.
Principle of Motor: A Motor works on the principle that when a rectangular coil its place in a magnetic field and current is passed through it. A force acts on the coil which rotates it continuously.
Working of electric Motor:



1) When electric current is passed into the rectangular coil. This current produces a magnetic field around the coil.
2) The magnetic field of horse shoe-type magnet then interacts with the magnetic field of the coil and causes the coil to rotate continuously.
3) If ABCD is in horizontal position current from battery enters the coil through brush B_1, and commutator half ring C_1. The Current flows in the direction ABCD and leaves via ring and brush B_2.
4) The direction of current is from A to B the direction of current is from C to D. The force on side AB of the coil is in the downward direction. Where as the force on the side CD of the coil is in the upward direction. ABCD rotate in anti clock wise direction.
5) While rotating when the coil reaches vertical position then the brushes B_1 and B_2 will touch the gap between the commutator rings and current to the coil is cut off. But the coil does not stop rotating because it has already gained momentum.
6) The comes to the right side. Again they comes in contact with brush B_1 Current direction is reversed.
7) The reversing of current is the coil is repeated after every half rotation due to which the coil continue to rotate as long as current from the battery is passed through it. The rotating shaft if electric motor can drive a large number of machines which are connected to it.

30. (a) Water of Crystallization: The water molecules which form part of the structure of a crystal are called water of crystallization. The salts which contain water of crystalization are called hydrated salts.

Activity:



1) Take some Copper Sulphate crystals in a dry boiling tube.
2) Heat the crystals strongly by keeping the boiling tube over the flame of a burner for some time.
3) On heating the blue Copper Sulphate crystals turns white and a powdery substance is formed we can also tiny droplets of water in the boiling tube.
4) Cool the boiling tube and add 2 or 3 drops of water on the white Copper sulphate powder formed above.
5) The blue colour of Copper Sulphate crystals is restored they become blue again.

(b) Postulates:

1. Electrons revolve around nucleus in stationary circular orbits of fixed energies which we call as energy levels.
2. As long as electron revolves in a stationary orbit it neither looses nor gains energy.
3. We denote these stationary orbits by the letters K, L, M, N.... or by the number n=1, 2, 3, 4.... where in stands for orbit number.
4. The energy of each orbit increases with increase in the distance of orbit from the nucleus i.e. energy of K shell < L-shell < M - shell < N shell.
5. When electron jumps from lower energy state to higher energy state it absorbs energy. Electron emitts energy if it jumps from higher energy state to lower energy state.

Limitations:

1) Neils bohr was able to explain the atomic spectrum of hydrogen and hydro gen like atoms with his postulates.
2) He is unable to explain the relative inte nsities of spectral times, the exis tence of hyperfine lines and the Zeeman effect.

31. a) Aim: To prove that the focal length of a convex lens is increased when it is kept in water.

Apparatus: convex Lens of known focal length, circular lens holder, tall cylindrical glass tumbler, back stone, water.

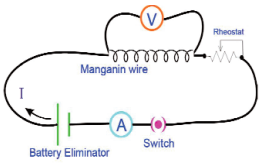
Procedure:

1) Take a cylindrical glass tumbler whose height is much greater than the focal length of the lens and fill it with water.
2) keep a black stone at the bottom of the vessel.
3) Now dip the Lens into water using circular Lens holder such that it is at a distance which is less than or equal to focal length of the Lens in air.
4) Now see through the lens to have a view of the black stone.
5) Now increase the height of the lens till you are not able to see the stone's image.
6) When the lens is dipped to height which is greater than the focal length of lens in air, we are able to see the image, Showing that focal length of the lens has increased water.
7) From this we conclude that the focal length of a convex lens is increased. When it is kept in water.

(b) Ohm's Law: The current through a conductor element is proportional to the potential difference applied between its end provided the temperature remains constant.

Aim: To show that the ratio of V/I is constant for a conductor

Materials required: 5 day cells of 1.5 V each, conducting wires, an ammeter, a voltmeter, thin iron spoke of length 10 cm, LED and key.



Procedure:

1) Connect a circuit as shown in the figure.
2) Solder the conducting wires to the ends of the iron spoke and close the key.
3) Note the reading of ammeter (Current) and Voltmeter (Potential difference) and tabulates them.

S.No. Potential difference (v) Current (I) V/I

4) Now connect two cells in the circuit and note the respective readings of ammeter and voltmeter in the above table.
5) Repeat the above procedure using three cells and four cells and five cells respectively.
6) Record the values of P.d and current corres ponding to each case in the above table.
7) Find the V/I for each set of values
8) we notice that V/I is constant.

32. (a) 1) A and D belong to same period B and C belong to the same period.

2) A, B coming in the same group.

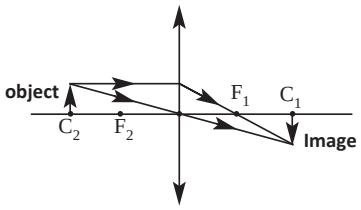
3) 'D' is the nobel gas.

4) 'C' belongs to 15th group and third period.

(b)

Functional group	Structural formula	Example	Suffix
Alcohol	R-OH	CH_3CH_2OH	-ol
Ether	R-O-R^1	CH_3OCH_3	alkoxy
Ester	R-COO-R	$CH_3COOC_2H_5$	oate
Amine	R-NH_2	CH_3-NH_2	Amine
Aldehyde	R-CHO	CH_3CHO	-al

33. a) ***i) Object is placed at C_2***

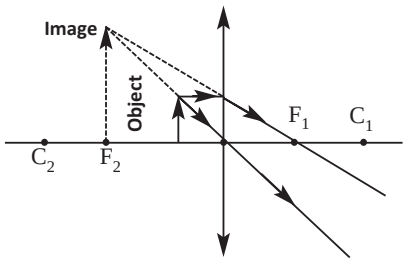


When the object is placed at C_2 we will get an image at C_1 which is real, inverted and of the same size as that of object.

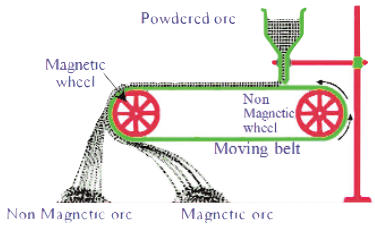
ii) Object is placed between F_2 and optic centre p.

If we place an object between focus and optic centre, we will get an image which is virtual, erect and magnified.

The image is formed on the same side of the lens where the object is placed.



b) ***Magnetic separation***



Magnetic separation