Tenth Class Physical Science Model paper

PHYSICAL SCIENCE

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

SECTION-I

12 × ½ = 6m

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

1. What is the value of Latent heat of vapourisation of water?
2. Which salt is used in the manufacture of borax?
3. You are given kerosene, ice and water. In which of these does the light travel faster?
4. Draw the plano-concave lens
5. Match the following

Section- A	Section -B
1. Myopia	a) convex lens
2. Hypermetropia	b) vision defect with age
3. presbyopia	c) concave lens

6. Splitting of spectral lines in the presence of electric field is called
a) Zeeman effect
b) Stark effect
c) Thomson effect
d) None of these
7. What are actinoids?
8. Give examples for Triple bond molecule
9. A battery of 6V is applied across a resistance of 15Ω. Find the current flowing through the circuit?
10. Which converts mechanical energy into electrical energy?
11. Name two metals which do not corrode readily.
12. Nano tubes are discovered by which scientist?

SECTION -II

8 × 1=8m

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

13. Can you take a photograph of a mirage
14. An object is placed at the focus of a concave lens. where will its image be formed
15. Define power of accommodation?
16. How is power related to current and voltage?
17. Give P^H value of Neutral, Acid, Base.
18. Write the four Quantum numbers for 1s electron
19. Write the shapes of H_2O and $BeCl_2$ molecules.
20. Explain the term gangue.

SECTION-III

8 × 2 = 16m

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

21. Explain why dogs pant during hot summer days using the concept of evaporation?
22. Determine the refractive index of benzene if the critical angle of it is 42°.
23. What do you meant by electric shock? Explain how it takes place?
24. What is a solenoid? Mention two ways to increase the strength of the field of a solenoid?
25. What is a neutralisation reaction? Give two examples.
26. List the factors that determine the type of bond that will be formed between two atoms
27. Rainbow is an example for continuous spectrum. Explain?
28. Why the colour of potassium permanganate disappears if it is added to warm solution of ethanol?

SECTION-IV

5 × 4 = 20m

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

29. (a) What is the principle of method of mixtures. verify it with an activity
(b) Deduce the expression for the equivalent resistance of the three resistors connected in parallel

30. (a) i) Aufbau principle
ii) Pauli's exclusion principle
(b) Explain the reaction of dilute acids with metals with an activity?

31. (a) How do you verify experimentally that $\frac{\sin i}{\sin r}$ is a constant?
(b) Suggest an experiment to produce rainbow in your class room and explain procedure?

32. (a) State the number of valence electrons, the group number and the period number of each element given in the following table

S.No	Element	Valance Electrons	Group Number	Period Number
1.	sulphur	6		
2.	Oxygen		16	2
3.	Magnesium	2		
4.	Hydrogen	1	-	
5.	Flourine	5	17	
6.	Aluminium		13	3

(b) Complete the following table

Functional formula	Structural	Example	Prefix	group
Alcohol	R-OH		Hydroxy	
Amine		CH_3NH_2		
Ketone		CH_3COCH_3		
Aldehyde	R-CHO		Formyl	
Ester	R COOR			

33. (a) Draw a neat diagram of an AC generator and label it neatly
(or)
(b) Draw a neat diagram of Blast Furnace and label it neatly.

ANSWERS

SECTION-I

1. 540 cal/gm
2. Washing soda ($Na_2CO_3.10H_2O$)
3. As ice has lowest refractive index, light travels faster in ice than kerosene and water.
4. plano-concave lens

5. 1-c, 2-a, 3- b;

6. b

7. Elements from $_{90}$Th to $_{103}$Lr are called actinoids

8. C_2H_2, N_2

9. Current $I = \frac{V}{R}$

$\Rightarrow I = \frac{6}{15} = 0.4\,Amp$

10. Generator

11. Gold and platinum.

12. Sumio lijima

SECTION-II

13. Yes, even though mirage is a virtual image we can take the photograph of a mirage.

14. The rays will appear to come from infinity. Therefore a virtual image is formed at infinity.

15. The ability or the property of the eye lens to adjust its focal length in order to able to focus both near and distant objects is known as the power of accommodation.

16. Power (P) = Potential difference (V) × current (I)
P = V×I

17. Neutral $P^H = 7$
Acids $P^H < 7$
Bases $P^H > 7$

18.

n	l	m_l	m_s
1	0	0	+½

19. Shape of Water (H_2O) is angular (or) V -shape.
Shape of $BeCl_2$ molecule is linear

20. Ores are associated with earthy or rocky materials as impurities. These impurities are called gangue or matrix.

SECTION-III

21. Dogs pant during hot summer days to reduce their internal temperature. When dogs pant, the water molecules present on the tongue and in the math gets evaporate by absorbing some heat from their body. As a result, the interior of dogs body gets cooled.

22. Given, critical angle (c)= 42°
Refractive index (n) = ?
Refractive index (n) = $\frac{1}{\sin C}$

$n = \frac{1}{\sin 42} = 1.51$

Refractive index of benzene is 1.51

23. If we touch a live wire of 240V, 0.00024 A of current passes through our body, then the functioning, of organs inside the body gets disturbed.
This disturbance inside the body felt as electric shock.
An electric shock can be experienced when there is a potential difference exists between one part of the body and another part.
Hence, the electric shock is combined effect of potential difference, electric current and resistance of the human body.

24. A coil of many circular turns of insulated copper wire wrapped closely in the shape of cylinder is called solenoid.
Two ways to increase the strength of the field of a solenoid
1. By increasing the number of turns
2. By increasing current

25. Neutralisation reaction:
The reaction of an acid with a base to give a salt and water is known as a neutralisation reaction.
Acid + Base → Salt + water

Ex: 1) $HCl_{(aq)} + NaOH_{(aq)} \rightarrow NaCl + H_2O$

2) $H_2SO_{4(aq)} + 2NaOH_{(aq)} \rightarrow Na_2SO_4 + 2H_2O$

26. The factors that determine the type of bond that will be formed between two atoms are:
1) Atomic size
2) Ionisation potential
3) Electron affinity

27. Sunlight has continuously varying wavelengths in it. when sunlight is dispersed through water droplet, a bright spectrum of continuously distributed colours is obtained. That is rainbow. Rainbow is continuous spectrum.

28. If we add potassium permanganate to the solution of ethanol then ethanol gets oxidised and acetic acid is formed. Due to this oxidation of ethanol potassium permanganate colour disappears.

$$\underset{\text{Ethanol}\ (\text{Ethyl alcohol})}{CH_3CH_2OH} \xrightarrow[\text{acidified } K_2Cr_2O_7 + \text{Heat}]{\text{alkaline } KMnO_4 + \text{Heat}}$$

$$\underset{\text{Ethanal}\ (\text{Acetaldehyde})}{CH_3CHO} \rightarrow \underset{\text{Ethanoic acid}\ (\text{Acetic Acid})}{CH_3COOH}$$

SECTION-IV

29. (a) Priciple of method of mixtures; When two or more bodies at different temper atures are brought into thermal contact, then net heat lost by the hot bodies is equal to the net heat gained by the cold bodies until they attain thermal equilibrium.
Net heat lost = Net heat gain

Activity:-

(i) Take 100 ml of water (mass m_1) at 90°C (T_1) and 200ml of water (mass m_2) at 60°C (T_2) and mix the two.

(ii) Find the final temperature (T) and the mixture.

(iii) You will notice that the temperature (T) of the mixture is lower than the hot water(T_1) and higher than the cold water(T_2).

(iv) This means that the hot water has lost heat and the cold water has gained heat.

(v) The amount of heat lost by the hotter sample(hot water) $Q_1 = m_1S(T_1-T)$

(vi) The amount of heat gained by the cooler sample(cold water) $Q_2 = m_2S(T-T_2)$

(vii) since heat lost by the hotter sample is equal to the heat gained by the cooler sample.

i.e. $Q_1 = Q_2$; $m_1S(T_1-T) = m_2S(T-T_2)$

$\therefore T = \frac{m_1T_1 + m_2T_2}{m_1 + m_2}$

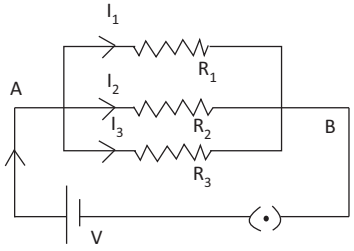
(b) Parallel connection of Resistors:-

Two or more resistors are said to be connected in parallel if same potential difference exists across them.

i) consider three resistors R_1, R_2, and R_3 connected in parallel.

ii) Suppose a current I flows through the circuit when a cell of voltage V is connected across the combination.

iii) The current I is divided as I_1, I_2 and I_3 which flows through R_1, R_2, and R_3 respectively



$I = I_1 + I_2 + I_3$_____(1)

By Ohm's law

$I_1 = \frac{V}{R_1}; I_2 = \frac{V}{R_2}; I_3 = \frac{V}{R_3}$

substituting the values of I_1, I_2 and I_3 in eq (1)

$I = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3}$....__(2)

Let us replace the three resistors with a single resistance R_{eq} such that the potential difference in the circuit does not change.

$\therefore R_{eq} = \frac{V}{I} \Rightarrow I = \frac{V}{R_{eq}}$

From eq(2)

$\frac{V}{R_{eq}} = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3}$ $\quad V.\frac{1}{R_{eq}} = V\left(\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}\right)$

$\therefore \frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$

30. (a)

1. Aufbau principle:-

According to this principle electrons enters the first orbital having lower energy levels

i) Electrons are assigned to orbital in order of increasing value of (n+*l*)

ii) For subshells with the same value of (n+*l*) electrons are assigned first to the sub shell with lower 'n'

2. Pauli's exclusion principle:-

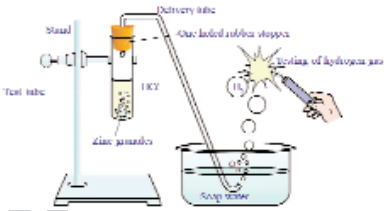
According to Pauli's exclusion principle no two electrons of the same atom can have all the four quantum numbers same.

If *n*, *l*, and *m* are same for two electrons then m_s must be different in the helium atom, the spins must be paired. Electron with paired spins are denoted by one electron has m_s = + ½ the other has m_s = -½.

They have anti parallel spins.

30. (b) Aim: To show that acid produce when hydrogen gas reacted with metals.

Material required: Test tube, delivery tube, glass trough, candle, Soap water, dil. HC*l*, Zn granules.



Procedure:

i) Set the apparatus as shown in figure

ii) Take about 10 ml of dil. HC*l* in a test tube and add a few granules to it.

iii) We observe a gas is evolved from the Zn granules.

iv) Pass the gas being evolved through the soap water.

v) We observe some bubbles formed in the soap solution.

vi) Bring a burning candle near the gas filled bubble

vii) The candle turn off with a pop sound.

viii) The pop sound indicates that the gas evolved in H_2

$2HCl + Zn \rightarrow ZnCl_2 + H_2\uparrow$

ix) Repeat this experiment with H_2SO_4, HNO_3 etc.

Observation: From the above experiment we conclude that hydrogen gas is produced when acid react with metals.

31. (a) Aim:

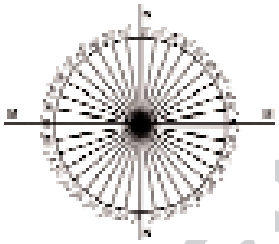
obtaining a relation between angle of incidence and angle of refraction.

Material required:

A plank, white Chart, protractor, scale small back painted plank, a semi circular glass disc of thickness nearly 2cm, pencil and laser light

Procedure:

i) Take a wooden plank which is covered with white chart.

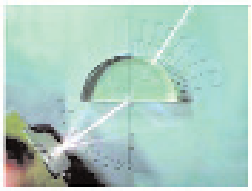


ii) Draw two perpendicular lines, passing through the middle of the paper as shown in the figure

iii) Let the point of intersection be 'O'. Mark the line as NN which is normal to the another line marked as MM.

iv) Here MM represents the line drawn along the interface of two media and NN represents the normal drawn to this line at 'O'.

v) Now place a semi-circular disc so that its diameter coincides with the interface line (MM) and its centre coincides with the point 'O'.



vi) Point a laser light along NN in such a way that the light propagates from air to glass through the interface at point 'O' and observe the path of laser light coming from the other side of the disc

vii) Now send laser light along a line which makes 15° angle (Angle of incidence) with NN and see that it passes through point 'O'.

viii) Measure the corresponding angle of refraction, by as serving laser light coming from the other side of the glass slab

ix) Note down these values i,r in a table. Repeat the same for the angles of incidence such as 20°, 30°, 40°, 50° and 60° and note the corresponding angle of refraction

i	**r**	**sin i**	**sin r**	$\frac{\textbf{Sin i}}{\textbf{Sin r}}$

x) Evaluate the value of $\frac{\text{Sin i}}{\text{Sin r}}$ for each case and you will find that its value is constant.

31. (b) Objects we need:- white card board tray, water, mirror

Procedure:-

1) Take a metal tray and fill it with water

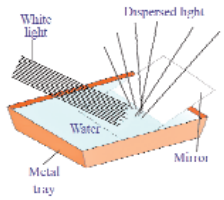
2) Place a mirror in the water such that it makes an angle to the water surface.

3) Now focus the white light on the mirror through the water as shown in the figure

4) Try to obtain colour on white card board sheet kept above the water surface.

5) Note the names of the colours you could see in the note book.

Observation:- White light dispersing into certain different colours as rainbow.



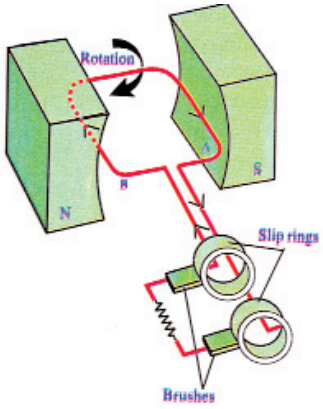
32. (a)

S.No	Element	Valance Electrons	Group Number	Period Number
1.	sulphur	6	16	3
2.	Oxygen	6	16	2
3.	Magnesium	2	2	3
4.	Hydrogen	1	-	1
5.	Flourine	5	17	2
6.	Aluminium	3	13	3

32. (b)

Functional group	Structural formula	Example	Prefix
Alcohol	R-OH	CH_3CH_2OH	Hydroxy
Amine	R-NH_2	CH_3NH_2	Amino
Ketone	R-CO-R	CH_3COCH_3	oxo
Aldehyde	R-CHO	CH_3CHO	Formyl
Ester	R COOR	$CH_3COOC_2H_5$	oxycar bonyl

33. (a) AC generator:



(b) Blast Furnace: