

BOARD OF SECONDARY EDUCATION (AP)
SUMMATIVE ASSESSMENT – I
TENTH CLASS GENERAL SCIENCE
PHYSICAL SCIENCE MODEL PAPER
PAPER – I (ENGLISH VERSION)

Time: 2 hrs. 45 mins.

PART – A & B

Maximum Marks: 40

INSTRUCTIONS:

- i) This Paper contains PART – A & B.
- ii) PART – A contains 3 – Sections (I, II, III), answer the questions under PART – A on separate answer book. Write the answers to the questions under PART – B on the question paper itself and attach it to the answer book of PART – A.
- iii) Answer all the questions. Internal Choice to the questions under Section – III.
- iv) In the duration of 2.45 hrs, 15 minutes of time is allotted to read the Question Paper.

Time: 2 hrs. 15 mins.

PART – A

Marks: 30

INSTRUCTIONS:

- i) PART – A comprises of three Sections I, II, III.
- ii) All the questions are compulsory.
- iii) There is no overall choice. However, there is an internal choice to the questions under Section – III.

SECTION – I

INSTRUCTIONS:

- i) Answer ALL the questions.
 - ii) Answer each question in 1 – 2 sentences.
 - iii) Each question carries ONE Mark. $4 \times 1 = 4$
1. A ray of light enters from air to a medium x. The speed of light in the medium is 1.5×10^8 m/s and the speed of light in air is 3×10^8 m/s. Find the refractive index of the medium x.
 2. Does the reverse process of evaporation take place? When and how does it take place?
 3. What type of reaction takes place in stomach when an antacid tablet is consumed?
 4. Can you take a photo of a mirage?

SECTION – II

INSTRUCTIONS:

- i) Answer ALL the questions.
 - ii) Answer each question in 4 – 5 sentences.
 - iii) Each question carries TWO Marks. $5 \times 2 = 10$
5. Both the precipitation and the neutralization reactions are double displacement reactions. Justify your answer with two examples.

6. Draw the ray diagram for a Concave mirror which produces a virtual image of an object on its principal axis.
7. A and B are two substances. Their temperatures are given at different stages.

	1	2	3	4	5
Substance A	30°C	50°C	-273°C	10 K	30 K
Substance B	30°C	30°C	0 K	20°C	30°C

By seeing the above information answer the following questions.

- 1) In which of the Cases A, B are in thermal equilibrium? Why?
 - 2) In which of the cases heat will be transferred from A to B.
8. Rakesh observed that light is travelling from water to crown glass. The refractive indices of the two are given below.

Water	1.33
Crown glass	1.52

Then answer the following questions.

- 1) Which is the denser medium and which is the rarer medium?
 - 2) What happens if light travels from crown glass to water.
9. A transparent sphere of radius R and refractive index 'n' is kept in air. At what distance from the surface of the sphere should a point object be placed on the principal axis so as to form a real image at the same distance from the second surface of the sphere.

SECTION – III

INSTRUCTIONS:

- i) Answer ALL the questions.
 - ii) Answer each question in 8 to 10 sentences.
 - iii) There is internal choice for each question, only one option from each question is to be attempted.
 - iv) Each question carries FOUR Marks. 4 × 4 = 16
10. A) Revathi observed reflection of light from a Concave mirror. How do you appreciate the use of reflection of light by a Concave mirror in making of TV antenna dishes?
- (OR)
- B) Ravi observed that during melting of ice the temperature remains constant for certain time. What is the reason behind that and explain process of melting.
11. A) Values of focal lengths are not written on the Concave mirrors you have. What tools do you need to find their focal lengths experimentally? How do you conduct the experiment?
- (OR)
- B) The refractive index of the material of a lens is 1.5. An object is placed at a distance of 30 cm in front of the lens and the image is formed at 20 cm. Find the focal length of the lens. What type of lens is that? Find the radius of curvature if the two radii are equal.
12. A) We have seen many combustion and oxidation reactions in our daily life. Among them every combustion reaction is an oxidation reaction. But not all the oxidation reactions are combustion reactions. Do you agree or disagree with the statement. Explain with proper reasons.

(OR)

B) The following chemicals are given to a student by his teacher. And asked him to perform experiments related to various types of chemical reactions. Explain how he had performed the experiments with equations.

I) Copper sulphate

II) Barium Chloride

III) Iron nails

IV) Ferrous sulphate crystals

V) Quick Lime

VI) Water

13. A) What is a Redox reaction. Describe an experiment to explain it.

(OR)

B) Describe the process of preparation of Bleaching Powder? Write its uses.

INSTRUCTIONS:

- i) Answer ALL the questions.
- ii) Each question carries $\frac{1}{2}$ Mark.
- iii) Marks will not be awarded in any case of any over writing, rewritten or erased answers.
- iv) Write the CAPITAL LETTER (A, B, C, D) showing the correct answer for the following questions in the brackets provided against them. $20 \times \frac{1}{2} = 10$

SECTION – IV

14. Which one of the following changes is not oxidation ()
 A) Corrosion B) Double displacement
 C) Rancidity D) Combination
15. This is used for treating indigestion ()
 1) Antibiotic 2) Antacid
 A) 1 is true 2 is false B) 1 and 2 are false
 C) 1 is false 2 is true D) 1 and 2 are true
16. Match the items. ()
 1) Plaster of paris P) $\text{CaSO}_4 \cdot 2 \text{H}_2\text{O}$
 2) Gypsum Q) $\text{Na}_2\text{CO}_3 \cdot 10 \text{H}_2\text{O}$
 3) Basic Salt R) $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$
 A) 1-P, 2-Q, 3-R B) 1-R, 2-P, 3-Q
 C) 1-Q, 2-R, 3-P D) 1-R, 2-Q, 3-P
17. Milk of magnesia is used in ()
 A) Fertilizer industry B) Textile industry
 C) Water purification D) Pharmaceutical Industry
18. Mirror which shows lateral inversion is ()
 1) Convex mirror 2) Plane mirror 3) Concave mirror
 A) 1, and 2 are correct B) 2 and 3 are correct
 C) 1, 2 and 3 are correct D) 2 is correct
19. What is the angle of incidence of a ray if the reflected ray is at an angle of 90° to the incident ray ()
 A) 60° B) 45° C) 90° D) 180°
20. The image formed by a camera and a simple of microscope are respectively ()
 1) real and virtual 2) virtual and real
 3) virtual and virtual 4) real and real
 A) 1, 2 and 3 are true B) 4 and 3 are true
 C) 1 is true D) 2 is true

21. State whether the statements given below are True (T) or False (F) ()
- 1) Both incident and reflected ray lie in the same plane
 - 2) Convex mirror is used as a back view mirror
 - 3) Concave lens is also called as converging lens
- A) 1, 2 and 3 are true
 B) 1 is false and 2 & 3 are true
 C) 1 and 2 are true 3 is false
 D) 1, 2 and 3 are false
22. Find the odd one out ()
- 1) $Q = ms\Delta t$
 - 2) $m = \frac{Q}{s\Delta t}$
 - 3) $\Delta t = \frac{Q}{ms}$
 - 4) $Q = \frac{ms}{\Delta t}$
- A) 4 B) 2 C) 3 D) 1
23. Arrange the following in an ascending order of their pH values. ()
- 1) Milk
 - 2) Coffee
 - 3) Lemon Juice
 - 4) Blood
- A) 2, 3, 1, 4 B) 1, 2, 3, 4 C) 4, 3, 2, 1 D) 3, 2, 1, 4
24. $x \text{ PbO} + \text{C} \longrightarrow y \text{ Pb} + \text{CO}_2$ in this equation x, y values are ()
- A) $x = 1, y = 2$ B) $x = 2, y = 2$
 C) $x = 2, y = 1$ D) $x = 3, y = 2$
25. 1 Cal = Joules. ()
- A) 41.86 B) 418.6 C) 4.186 D) 4186
26. The specific heats of these two substances are the same ()
- A) Zinc and Copper
 B) Water and Sea water
 C) Ice and Kerosene
 D) Lead and Mercury
27. S.I. unit of latent heat of vaporization is ()
- A) Joule/kg B) Joule C) Cal D) Cal/kg
28. $2 \text{ PbO(s)} + \text{C(s)} \longrightarrow 2 \text{ Pb(s)} + \text{CO}_2(\text{g})$
 Which of the following statements are correct for the above chemical reactions? ()
- a) Lead is reduced
 - b) Carbondioxide is oxidized
 - c) Carbon is oxidized
 - d) Lead oxide is reduced
- A) a and b B) a and c C) a, b, and c D) All
29. What colour would Hydrochloric acid (pH = 1) turn universal indicator? ()
- A) Orange B) Purple C) Yellow D) Red

30. The angle of deviation produced by the glass slab is ... ()
A) 0°
B) 20°
C) 90°
D) depends on the angle formed by the light ray and normal to the slab
31. Which one of the following materials cannot be used to make a lens. ()
A) Water B) Glass C) Plastic D) Clay
32. The relation between the focal length (f) and radius of curvature (R) of a Concave mirror is ()
A) $R = \frac{f}{2}$ B) $R = 2f$ C) $\frac{f}{R} = 2$ D) $2R = f$
33. These behave like heat 'Store houses' for the earth ()
A) Rivers B) Concrete buildings
C) Oceans D) Forests

ANSWERS

PART - A

SECTION - I

1. A ray of light enters from air to a medium x. The speed of light in the medium is 1.5×10^8 m/s and the speed of light in air is 3×10^8 m/s. Find the refractive index of the medium x.

A: We know: Refractive index of medium = $\frac{\text{Velocity of light in vacuum or air}}{\text{Velocity of light in the medium}}$

$$\text{Refractive index of the medium} = \frac{3 \times 10^8 \text{ m/s}}{1.5 \times 10^8 \text{ m/s}} = 2$$

2. Does the reverse process of evaporation take place? When and how does it take place?

- A: ★ Yes reverse process of evaporation take place. The reverse process of evaporation is condensation.
 ★ Heat is taken by the system in evaporation. Condensation takes place by giving away the heat by the system.
 ★ Water in a dish evaporates. If the water vapour is cooled it condenses to water.

3. What type of reaction takes place in stomach when an antacid tablet is consumed?

- A: ★ As the stomach produces too much of acid, it causes pain and irritation in the stomach. This we call it as acidity.
 ★ When we use an antacid, as it is an alkali, it neutralizes the excess acid in the stomach and gives relief. This is neutralization reaction.

4. Can you take the photo of a mirage?

- A: ★ Yes we can take the photo of a mirage. The formation of a mirage is a real optical phenomenon and so it can be captured on camera
 ★ Mirage is formed due to light rays actually refracted to form the false image at the observer's location.

SECTION - II

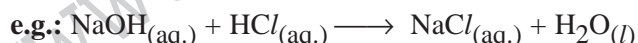
5. Both the precipitation and neutralization reactions are double displacement reactions justify your answer with two examples.

- A: **Precipitation reaction:** Any reaction in which an insoluble solid called precipitate is formed that suddenly separates from the solution is called a precipitation reaction.



The above reaction is a double displacement reaction.

- ★ The reaction of an acid with a base to give salt and water is known as a neutralization reaction.

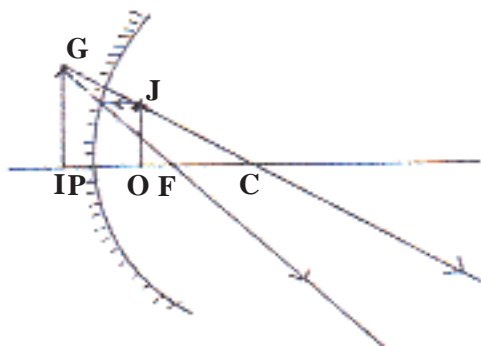


Base Acid Salt Water

The above reaction is a double displacement reaction.

6. Draw the ray diagram for a Concave mirror which produces a virtual image of an object on its principal axis.

A:



Object: OJ is in between the pole and principal focus.

Image: IG is behind the mirror.

- ★ This is seen only in the mirror.
- ★ The image is enlarged and virtual.

7. A and B are two substances. Their temperatures are given at different stages.

	1	2	3	4	5
Substance A	30°C	50°C	-273°C	10 K	30 K
Substance B	30°C	30°C	0 K	20°C	30°C

By seeing the above information answer the following questions.

- 1) In which of the cases A, B are in thermal equilibrium? Why

A: In the first and third cases A and B are in thermal equilibrium. In these cases both A and B are at the same temperatures.

- 2) In which of the cases heat will be transferred from A to B.

A: In the second case heat would be transferred from A to B. The temperature of A is higher than the temperature of B.

8. Rakesh observed that light is travelling from water to crown glass. The refractive indices of the two are given below. Then answer the following questions.

Water	1.33
Crown glass	1.52

- 1) Which is the denser medium and which is the rarer medium?

A: Water acts as rarer medium and crown glass becomes denser medium.

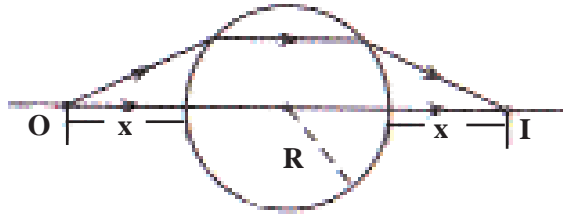
- 2) What happens if light travels from crown glass to water?

A: When light travels from crown glass (denser) to water (rarer) the refracted ray bends away from the normal at the point of incidence.

- ★ This is because the speed of light increases.

9. A transparent sphere of radius R and refractive index 'n' is kept in air. At what distance from the surface of the sphere should a point object be placed on the principal axis so as to form a real image at the same distance from the second surface of the sphere?

A:



- ★ From the symmetry of the figure, the rays must pass through the sphere parallel to the principal axis.
- ★ From the figure: $u = -x$ and $v = \infty$
(refracted ray is parallel to the optical axis after refraction at the first surface)
- ★ $n_1 = 1$ and $n_2 = n$ (here n_1 is the refractive index of air)

Formula: (Using: $\frac{n_2}{v} - \frac{n_1}{u} = \frac{(n_2 - n_1)}{R}$)

$$\therefore \frac{n}{\infty} - \frac{1}{(-x)} = \frac{(n - 1)}{R} \quad (\text{or}) \quad \frac{1}{x} = \frac{(n - 1)}{R}$$

$$\therefore x = \frac{R}{(n - 1)}$$

- ★ Object distance from the first surface of the sphere is $x = \frac{R}{(n - 1)}$

SECTION – III

10. A) Revathi observed reflection of light from a Concave mirror. How do you appreciate the use of reflection of light by a Concave mirror in making of T.V. antenna dishes?

- A:
- ★ Revathi observed that Parallel beam of light rays incident on a Concave mirror are converging at its focus.
 - ★ The Concave shape or the parabolic shape of a dish also reflects the incident parallel signals at the dish's focal point.
 - ★ A device called feed horn is mounted on brackets at the dish's focal point.
 - ★ This feed horn is a waveguide. This gathers the signals at or near the focal point of the dish and then conducts them to a LNB (Low-Noise Block) down convertor.
 - ★ The LNB converts these electromagnetic waves into electric signals and transmits to the receiver (TV set)
 - ★ All this process is made possible only with parabolic (Concave shape) dish antennas.
 - ★ Now a days TV is an important item in every house I appreciate the application of Concave mirrors property in the preparation of parabolic dish antenna.

(OR)

- B) Ravi observed that during melting of ice the temperature remains constant for certain time. What is the reason behind that and explain the process of melting.

- A:
- ★ The heat energy supplied to the ice increases the internal energy of the molecules of ice.
 - ★ This increase in internal energy of molecules weakness the bonds as well as breaking the bonds between the molecules in ice that is why ice becomes water.

- ★ This process takes place at a constant temperature 0°C or 273 K. This temperature is called the melting point of ice. This process is called melting.
- ★ The temperature of ice does not change during melting. This is because the heat energy given to the ice is completely utilized in breaking the bonds between the ice molecules.

11. A) Values of focal lengths are not written on the concave mirrors you have. What tools do you need to find their focal lengths experimentally? How do you conduct the experiment?

A: **Materials required:** A candle, paper, concave mirror, V stand, measuring tape, meter scale, screen (white paper).

Procedure:

- ★ Place the Concave mirror on V-stand.
- ★ Place the candle far away from the mirror such that parallel rays would fall on the mirror.
- ★ Adjust the screen in such a way that a point sized image is obtained on the screen.
- ★ Measure the distance between the mirror and the screen, which gives the focal length of the Concave mirror.
- ★ Repeat the experiment with different Concave mirrors. We could find their focal lengths in the same way as described above.

(OR)

B) The refractive index of the material of a lens is 1.5 an object is placed at a distance of 30 cm in front of the lens and the image is formed at 20 cm. Find the focal length of the lens. What type of lens is that? Find the radius of curvature if the two radii are equal.

A: **Given:** Refractive index $n = 1.5$

Object distance $u = -30$ cm

Image distance $v = -20$ cm

focal length $f = ?$

Formula: $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$

Substituting the values: $\frac{1}{f} = -\frac{1}{30} - \frac{1}{20} = \frac{-2-3}{60} = \frac{-5}{60} = \frac{-1}{12}$

∴ $f = -12$ cm = Focal length of the lens.

- ★ The negative sign indicates that the lens is a Concave lens.
- ★ The radii of curvature of both sides are equal.
- ★ Radius of curvature $2f = 2 \times 12 = 24$ cm.

12. A) We have seen many combustion and oxidation reactions in our daily life. Among them every combustion reaction is an oxidation reaction. But not all oxidation reactions are combustion reactions. Do you agree or disagree with the statement. Explain with proper reasons.

A: 1) **Burning of coal:** When coal is burnt in Oxygen, Carbon dioxide is produced



This is both a combustion and oxidation reaction.

2) Combustion is burning of a substance in the presence of Oxygen. Combustion is oxidation reaction because oxidation is addition of Oxygen to a substance.

- 3) All oxidation reactions do not require burning for example rusting of iron is an oxidation reaction but it is not a combustion reaction.
- 4) Similarly Rancidity is also an oxidation reaction but it is not a combustion reaction.
- 5) So I agree with the statement that every combustion reaction is an oxidation reaction but not all oxidation reactions are combustion reactions.

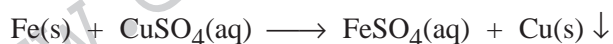
(OR)

B) The following chemicals are given to a student by his teacher and asked him to perform experiments related to various types of chemical reactions. Explain how he had performed the experiments with equations.

- i) Copper sulphate
- ii) Barium chloride
- iii) Iron nails
- iv) Ferrous sulphate crystals
- v) Quick lime
- vi) Water

A: 1) i) Copper sulphate and iii) Iron nails

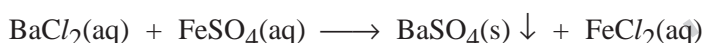
★ When Iron nails are placed in Copper sulphate solution, Iron displaces Copper from Copper sulphate solution. This is because Iron is more active than Copper.



★ This is chemical displacement reaction.

2) ii) Barium chloride and iv) Ferrous sulphate

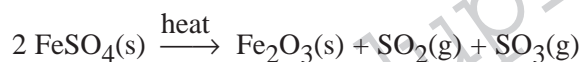
★ When Ferrous sulphate solution is mixed with Barium chloride solution we get a precipitate of Barium sulphate.



★ This is chemical double displacement reaction. Also it is precipitation reaction.

3) iv) Ferrous sulphate crystals.

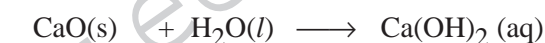
★ When Ferrous sulphate crystals are heated it dissociates in to $\text{Fe}_2\text{O}_3(\text{s})$, $\text{SO}_2(\text{g})$ and $\text{SO}_3(\text{g})$



★ This is an example of chemical decomposition.

4) v) Quick lime and vi) Water

★ When water is added to quick lime we get slaked lime.

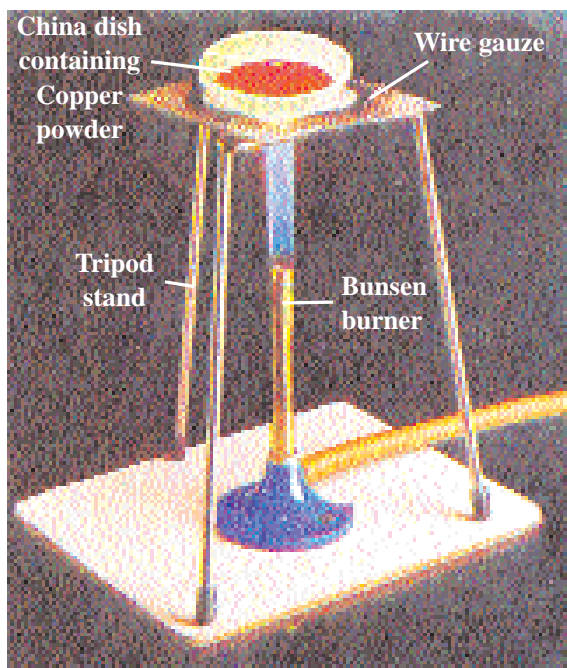


quick lime water slaked lime

★ This is an example of chemical combination.

13. A) What is a redox reaction. Describe an experiment to explain it.

A:



Oxidation of Copper to copper oxide

- ★ If oxidation and reduction occur in the same reaction, then we call it redox reaction.

Experiment:

- ★ Take about 1.0 gm of Copper powder in a China dish.
- ★ Keep the China dish on a tripod stand containing wire gauge.
- ★ Heat it with a bunsen burner or a spirit lamp.
- ★ We will notice that the surface layer of Copper becomes black.
- ★ The reaction is $2 \text{Cu(s)} + \text{O}_2(\text{g}) \xrightarrow{\text{heat}} 2 \text{CuO(s)}$
- ★ Here Copper combines with Oxygen to form Copper oxide. This is oxidation reaction.
- ★ Now pass Hydrogen gas over hot Copper oxide obtained.
- ★ We will notice that the black coating on Copper turns brown, because Copper oxide loses Oxygen to form Copper.
- ★ In this process Oxygen is lost and the process is called reduction



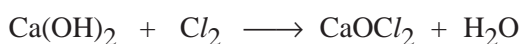
- ★ This is known as redox reaction.

(OR)

B) Describe the process of preparation of Bleaching Powder? Write its uses.

A: Preparation of Bleaching Powder:

- ★ When aqueous Sodium chloride is put to electrolysis chlorine gas is produced.
- ★ This Chlorine gas is used for the preparation of bleaching powder.
- ★ Bleaching powder is produced by the action of chlorine on slaked lime.



(Bleaching powder)

Uses:

- ★ In textile industry it is used for bleaching cotton and linen.
- ★ In paper industry it is used for bleaching wood pulp.
- ★ In many chemical industries it is used as an oxidizing agent.
- ★ To make the drinking water free from germs it is used as a disinfectant.
- ★ In the preparation of Chloroform it is used as a reagent.

ANSWERS

PART – B

14-B; 15-C; 16-B; 17-D; 18-D; 19-B; 20-C; 21-C; 22-A; 23-D; 24-B; 25-C; 26-C; 27-A; 28-B; 29-D; 30-A; 31-D; 32-B; 33-C.

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