

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

Time: 2 hrs. 45 mins.

PART – A & B

Maximum Marks: 40

INSTRUCTION:

- 1) This paper contains PART – A and PART – B.
- 2) PART – A contains 3 sections, answer the questions under PART – A on separate answer book. Write the question paper itself and attach it to the answer book of PART – A.
- 3) Answer all the questions. Internal Choice is given to the questions under Section – III.
- 4) In the duration of 2 hrs. 45 mins., 15 minutes of time is allotted to read the question paper.

Time: 2 hrs.

PART – A

Marks: 30

INSTRUCTIONS:

- 1) PART – A comprises of three Sections I, II and III.
- 2) All the questions are compulsory.
- 3) There is no overall choice. However there is an Internal Choice to the questions under Section – III.

SECTION – I

Note: i) Answer ALL the questions.

ii) Answer each questions in 1 – 2 sentences.

iii) Each question carries ONE Mark.

4 × 1 = 4

1. Two students while walking on the road in the afternoon found image of water on the road when they went near nothing was found. Guess what could be the reason for this.
2. +50 cm focal length bi-convex lens is recommended to correct the defect of vision of a man. Find the power of the lens.
3. Which colours do you observe when an iron rod is gradually heated to higher temperatures?
4. Why does the soil of agricultural lands get tested for pH.

SECTION – II

Note: i) Answer ALL the questions.

ii) Answer each question in 4 – 5 sentences.

iii) Each question carries TWO Marks.

5 × 2 = 10

5. Your friend required a resistor of resistance 10 Ω, you are having 40 Ω resistances with you.
 - a) How many resistors he will ask from you.
 - b) How will he connect the resistors.
 - c) Show their equivalent resistances is 10 Ω

6. If the focal length of a symmetric convergent lens is equal to the radius of curvature of its surface, then find its refractive index.
7. Draw the structure of menthane molecule write its bond angle.
8. Do you agree with the statement 'All ores are minerals but all minerals need not be ores'. Why?
9. a) $\text{CaCO}_3 (\text{s}) \longrightarrow \text{CaO} (\text{s}) + \text{CO}_2 (\text{g})$
b) $2 \text{AgBr} (\text{s}) \longrightarrow 2 \text{Ag} (\text{s}) + \text{Br}_2 (\text{g})$

Mention the types of reactions to which the above equations belong. Also mention which of them is a photochemical reaction.

SECTION – III

Note: i) Answer ALL the questions.

ii) Answer each question in 8 – 10 sentences.

iii) Each questions carries FOUR Marks.

iv) There is Internal Choice for each question. Only one option from each question is to be attempted. **4 × 4 = 16**

10. a) Revathi observed that petrol kept in a vessel disappears after some time. Rani heated water in a beaker and turned into water vapour. How would you distinguish between these processes?

(OR)

b) i) Where is the base of the candle expected to be in the image when the candle is placed on the axis of the mirror.

ii) An object is placed at a distances of 10 cm from a convex mirror of focal length 15 cm. Find the position and nature of the image.

11. a) i) State and explain Kirchoff's junction law.

ii) Deduce an expression for the equivalent resistance of three resistors connected in parallel.

(OR)

b) i) Compare the magnetic field lines of force formed around a current carrying solenoid with the magnetic field lines of force of a bar magnet.

ii) What is the value of 1 kWh in joules?

12. a) Draw Moller's chart showing the increasing order of energy levels of various orbitals.

(OR)

b) Two elements X and Y belong to groups 1 and 2 respectively in the same period of the periodic table. Compare these elements with respect to.

i) Number of electrons in their outer most orbit.

ii) Their atomic size and their valencies.

iii) Their ionisation energy and metallic character.

iv) Formula of their chlorides and sulphates.

13. a) State the methods used for the purification of crude metals. Explain in which context these methods are used.

(OR)

b) How do you explain the process of artificial ripening of fruits by ethylene.

Time: 30 Minutes

PART – B

Marks: 10

INSTRUCTIONS:

i) Answer ALL the questions.

ii) Each question carries $\frac{1}{2}$ mark.

iii) Answers are to be written in question paper only.

iv) Marks will not be awarded in any case of over writing, rewriting or erased answers.

v) Write the CAPITAL LETTER (A, B, C, D) showing the correct answer for the following questions in the brackets provided against them. $20 \times \frac{1}{2} = 10$

14. $\text{Zn} + 2 \text{HCl} \longrightarrow \text{ZnCl}_2 + \text{H}_2$ is an example for ()
 A) Chemical combination B) Chemical decomposition
 C) Chemical displacement D) Chemical double displacement
15. Which one of the following metals react both with acid and base and releases hydrogen gas? ()
 A) Na B) Fe C) Zn D) Cu
16. Principal quantum number 3 refers to ()
 A) M – main shell B) N – main subshell
 C) d – subshell D) f – subshell
17. Match the following. ()
 1) s – block elements P) Inner transition elements
 2) f – block elements Q) Transition elements
 3) d – block elements R) Representative elements
 A) 1–R, 2–Q, 3–P B) 1–Q, 2–P, 3–R
 C) 1–R, 2–P, 3–Q D) 1–P, 2–Q, 3–R
18. Which of the following compounds will not give addition reaction. ()
 A) Ethene B) Ethyne C) Propane D) Methane
19. Sidwick and Powell proposed VSPERT valence bond theory was suggested by ()
 A) Lewis B) Linus Pauling C) Kossel D) Pauli
20. Arrange the following in a systematic order. ()
 i) Modern periodic table ii) Law of octaves
 iii) Periodic table iv) Law of triads
 A) i, ii, iii, iv B) ii, i, iv, iii C) iv, ii, iii, i D) iii, ii, iv, i
21. Antacid medicine is used for indigestion because ()
 A) it neutralizes the acid produced.
 B) it neutralizes digested food material.
 C) it oxidizes food material.
 D) it helps to produce digestive juice.

22. Speed of light is ()
A) 3×10^8 ms B) 3×10^8 m/s
C) 3×10^{-8} ms D) 3×10^{-8} m/s
23. The angular momentum quantum number is related to ()
A) Size of the orbit B) Orientation of orbital in space
C) Orientation of the spin of the electron D) Shape of the orbital
24. Rate of evaporation of a liquid depends on ()
1) its surface area 2) mass 3) its temperature
A) Only 1 is correct B) Both 1 and 2 are correct
C) 1, 2, 3 are correct D) Both 1 and 3 are correct
25. The magnetic force (F) on a current carrying wire placed in uniform magnetic field if the wire is oriented perpendicular to magnetic field is ()
A) 0 B) $\frac{ILB}{2}$ C) 2 ILB D) ILB
26. Which of the following does not lie in the plane of reflection
A) reflecting surface B) incident ray
C) reflected ray D) normal at the point of incidence
27. If the refracted ray from a convex lens is travelling parallel to the principal axis, then image distance is ()
A) equal to object distance
B) infinity
C) equal to focal length of the lens
D) equal to radius of curvature of the lens
28. Effect of dispersion of light among the following is
A) Mirage B) Blue colour of the sky
C) Rainbow D) Twinkling of stars
29. The equivalent resistance due to series connection of 10Ω and 10Ω resistors is ()
A) 5Ω B) 20Ω C) 0Ω D) 10Ω
30. The disaster caused due to an overload can be avoided by using a/an ()
A) fuse B) ammeter C) voltmeter D) switch
31. Which of the following electrical devices that work on the the principle of electro – magnetic induction ()
A) electric fan B) electric bulb C) electric cooker D) LED
32. The frequency of direct current is ()
A) 50 Hz B) 60 Hz C) zero D) 100 Hz
33. During refraction will not change. ()
A) wave length B) frequency C) speed of light D) all the above

ANSWERS
PART – A
SECTION – I

1. Two students while walking on the road in the afternoon found image of water on the road. When they went near nothing was found. Guess what could be the reason for this.

A: ♦ They saw the mirage due to total internal reflection.

♦ This illusion is due to virtual image of the sky (mirage) and an inverted image of tree on the road.

2. +50 cm focal length bi-convex lens is recommended to correct the defect of vision of a man. Find the power of the lens.

A: Focal length of bi-convex lens $f = +50$ cm

$$\text{Power of the lens } P = \frac{100}{f(\text{cm})}$$

$$\therefore P = \frac{100}{50} = 2 \text{ Dioptre}$$

3. Which colour do you observe when an iron rod is gradually heated to higher temperatures.

A: ♦ First iron turns into red (lower energy corresponding to higher wave length).

♦ As the temperature rises it glows and turns into orange, yellow, blue or even white respectively (higher energy and lower wave length).

4. Why does the soil of agricultural lands get tested for pH.

A: Plants require a specific pH range for their healthy growth. So finding pH of a soil suggest the farmers to treat the fields with acidic or basic substances to maintain the required pH range.

SECTION – II

5. Your friend required a resistor of resistance 10Ω , you are having 40Ω resistances with you

a) How many resistors he will ask from you.

b) How will he connect the resistors.

c) Show their equivalent resistance is 10Ω .

A: a) My friend will ask for four resistors each of resistance 40Ω .

b) He will connect these resistors in parallel.

c) Let R be the equivalent resistance of the parallel combination of these resistors.

$$\text{then } \frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \frac{1}{R_4}$$

$$\therefore \text{Here } R_1 = R_2 = R_3 = R_4 = 40 \Omega$$

$$\therefore \frac{1}{R} = \frac{1}{40} + \frac{1}{40} + \frac{1}{40} + \frac{1}{40} = \frac{4}{40} = \frac{1}{10}$$

$$\therefore R = 10 \Omega$$

6. If the focal length of a symmetric convex lens is equal to its radius of curvature of its surface, then find its refractive index.

A: Refractive index of the material of the lens $n = ?$

Focal length of the lens $f = R$

As the lens is a symmetric convex lens

$$R_1 = R_2 = R$$

Formula: Lens maker's formula

$$f = (n - 1) \left(\frac{1}{R_1} - \frac{1}{R_2} \right)$$

But $R_1 = +ve$ and $R_2 = -ve$

$$\therefore \frac{1}{f} = (n - 1) \left(\frac{1}{R_1} + \frac{1}{R_2} \right)$$

substituting the values

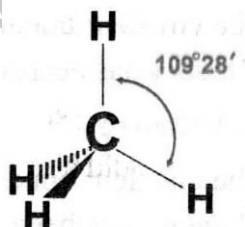
$$\therefore \frac{1}{f} = \frac{1}{R} = (n - 1) \left(\frac{1}{R} + \frac{1}{R} \right) = \frac{2(n - 1)}{R}$$

$$\therefore \frac{1}{R} = \frac{2(n - 1)}{R} \text{ or } 1 = 2(n - 1)$$

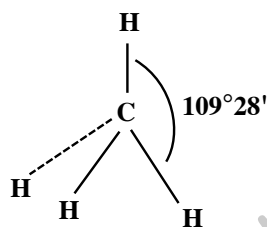
$$\therefore 2n = 1 + 2 = 3 \text{ or } n = \frac{3}{2} = 1.5$$

7. Draw the structure of methane molecule write its bond angle.

A:



(OR)



8. Do you agree with the statement 'All ores are minerals but all minerals need not be ores'. Why?

A: ♦ Yes, I agree with the statement. The elements or compounds of the metals which occur in nature in the earth's crust are called minerals.

♦ Ore is a mineral from which the metal is profitably extracted.

♦ For example aluminium exists in two mineral forms namely clay and bauxite.

♦ But aluminium is mainly extracted from bauxite which contains 70% aluminium oxide.

♦ So bauxite is an ore of aluminium where as clay is not an ore.

♦ So all ores are minerals but all minerals need not be ores.

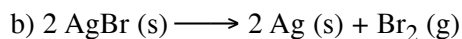
9. a) $\text{CaCO}_3 (\text{s}) \longrightarrow \text{CaO} (\text{s}) + \text{CO}_2 (\text{g})$

b) $2 \text{AgBr} (\text{s}) \longrightarrow 2 \text{Ag} (\text{s}) + \text{Br}_2 (\text{g})$

Mention the types of reactions to which the above equations belong. Also mention which of them is a photochemical reaction.

A: a) $\text{CaCO}_3 (\text{s}) \longrightarrow \text{CaO} (\text{s}) + \text{CO}_2 (\text{g})$

It is a chemical decomposition reaction.



It is also a chemical decomposition reaction.

It is also a photochemical reaction.

This reaction takes place in the presence of sun light.

SECTION – III

10. a) Revathi observed that petrol kept in a vessel disappears after some time. Rani heated water in a beaker and turned into water vapour. How would you distinguish between these processes.

- A:
- ◆ Petrol kept in a vessel disappears after some time due to evaporation.
 - ◆ Water in a beaker turned into water vapour due to heating is because of boiling.

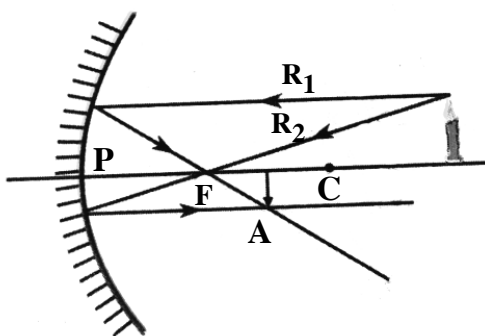
Evaporation	Boiling
1. At every temperature evaporation takes place.	1. At a particular temperature boiling takes place.
2. It is a surface phenomenon.	2. It is a bulk phenomenon.
3. It is a cooling process.	3. It is a warming process.
4. Bubbles are not formed.	4. Bubbles are formed.
5. Rate of evaporation increases in the temperature.	5. Boiling point is affected by atmospheric pressure.
6. The temperature will not be constant at any interval of time.	6. The temperature remains constant until the entire liquid turns into vapour.

(OR)

b) i) Where is the base of the candle expected to be in the image when the candle is placed on the axis of the mirror.

ii) An object is placed at a distance of 10 cm from a convex mirror of focal length 15 cm. Find the position and nature of the image.

A: i)



- ◆ Any ray coming from any point on the axis and travelling along the axis will get reflected on the axis itself.
- ◆ This means that the base of the image will be on the axis itself.
- ◆ If the object is placed vertically on the axis, the image is going to be vertical.
- ◆ Draw a perpendicular from point A to the axis.
- ◆ The intersection point is the point where the base of the image of the candle is likely to be formed when the object is placed beyond the centre of curvature (C).

ii) **Given:** Object distance $u = -10$ cm

focal length of the lens $f = 15$ cm

Image distance $v = ?$

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

substituting the values

$$\frac{1}{f} = \frac{1}{u} + \frac{1}{v} = \frac{1}{15} - \frac{1}{-10} = \frac{1}{15} + \frac{1}{10}$$

$$\therefore \frac{1}{v} = \frac{2+3}{30} = \frac{5}{30} = \frac{1}{6}$$

\therefore Image distance $v = 6$ cm

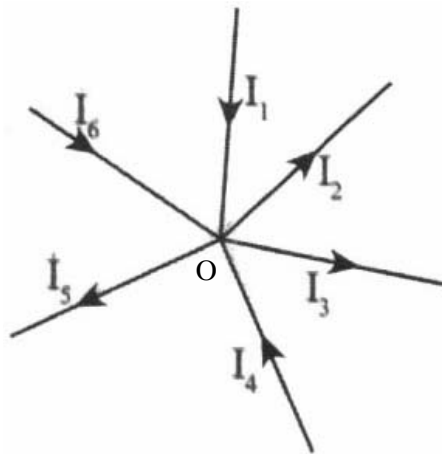
The image is an erect virtual image formed behind the mirror.

11. a) i) **State and explain Kirchhoff's junction law.**

ii) **Deduce an expression for the equivalent resistance of three resistors connected in parallel.**

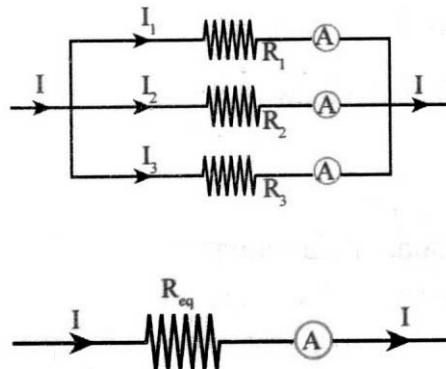
A: i) **Junction law:** At any junction point in a circuit where the current can divide, the sum of the currents into the junction must equal to the sum of the currents leaving the junction. This means that there is no accumulation of electric charges at any junction in a circuit.

Explanation: From the figure we have $I_1 + I_4 + I_6 = I_5 + I_2 + I_3$



This law is based on the conservation of charge.

ii) **Equivalent resistance of a parallel connection**



◆ The schematic circuit of the resistances connected in parallel is shown in the figure

According to Ohm's law.

Current through R_1 is $I_1 = \frac{V}{R_1}$

Current through R_2 is $I_2 = \frac{V}{R_2}$

Current through R_3 is $I_3 = \frac{V}{R_3}$

◆ Let R_{eq} be the equivalent resistance of the resistors in parallel.

We get $I = \frac{V}{R_{eq}}$

◆ Substituting the values of I , I_1 , I_2 and I_3 in the equation $I = I_1 + I_2 + I_3$

We get $\frac{V}{R_{eq}} = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3}$

(or)

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

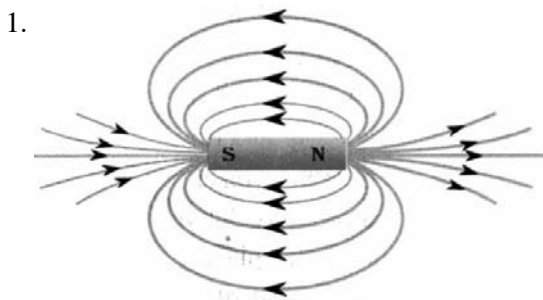
∴ The equivalent resistance of a parallel combination is less than the resistance of each of the resistors

(OR)

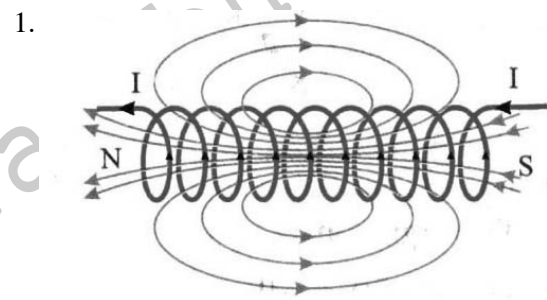
b) i) Compare the magnetic field lines of force formed around a current carrying solenoid with the magnetic field lines of force of a bar magnet.

ii) What is the value of 1 kWh in Joules?

A: i) **Magnetic field lines of a bar magnet**



Magnetic field lines of a solenoid



2. Outside the magnet direction of the field lines is from North to South pole.

2. Outside the solenoid the direction of the field lines is from North to South pole.

3. The direction of the field lines inside the magnet looks like from South to North pole.

3. The direction of the field lines inside the solenoid is from South to North pole.

4. These lines are closed loops.

4. These lines are also closed loops.

5. We cannot find the field lines inside the magnet.

5. We can find the field lines inside the solenoid.

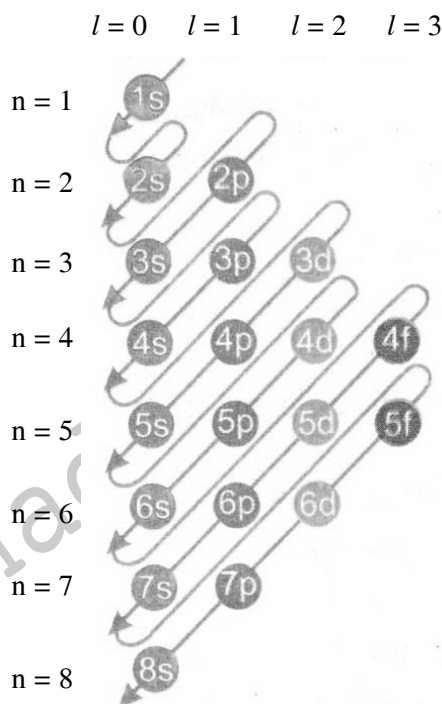
6. These field lines are also similar to the field lines formed by a solenoid.

6. These field lines are also similar as field lines formed by a bar magnet.

- ii) $1 \text{ kWh} = 1000 \text{ W} \times 1 \text{ hour}$
 $= 1000 \text{ J/s} \times 60 \times 60 \text{ sec}$ (Watt = Joule/ sec)
 $= 36 \times 10^5 \text{ Joules}$

12. a) Draw Moller's chart showing the increasing order of energy levels of various orbitals.

A: Moller chart



The filling order of atomic orbitals

(OR)

b) Two elements X and Y belong to groups 1 and 2 respectively in the same period of the periodic table. Compare these elements with respect to

- i) Number of electrons in their outermost orbit.
- ii) Their atomic size and their valencies.
- iii) Their ionisation energy and metallic character.
- iv) Formula of their chlorides and sulphates.

- A: i) ♦ The number of electrons in the outer most orbit of elements X = 1.
 ♦ The number of electrons in the outermost orbit of elements Y = 2.
- ii) The atomic size of Y is lesser than X valency of X = 1, valency of Y = 2.
- iii) The ionisation energy of Y is greater than X. X has higher metallic character than Y.
- iv) Chloride of X – XCl, Chloride of Y – YCl₂
 Sulphate of X – X₂SO₄, Sulphate of Y – YSO₄

13. a) State the methods used for purification of crude metals. Explain in which context these methods are used.

- A: ♦ The process of obtaining the pure metal from impure metals is called refining of the metal.
 ♦ Some of the processes of refining are
- i) Distillation
 - ii) Poling
 - iii) Liqutation
 - iv) Electrolytic refining

- ◆ The process that has to be adopted for purification of a given metal depends on the nature of the metal and its impurities.

Various methods adopted in purification of metals:

Distillation: This method is very useful for purification of low boiling point metals like zinc and mercury containing high boiling point metals as impurities. The extracted metal in the molten state is distilled to obtain the pure metal as distillate.

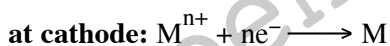
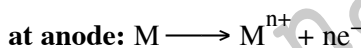
Poling: The molten metal is stirred with logs (poles) of green wood. The impurities are removed either as gases or they get oxidized and form slag over the surface of molten metal.

Liquation: Low melting point metal like tin can be made to flow on a slope surface to separate it from high melting point impurities.

Electrolytic refining: In this method, the impure metal is made to act as anode.

- ◆ A strip of the same metal in pure form is used as cathode.
- ◆ They are put in a suitable electrolytic bath containing soluble salt of the same metal.
- ◆ The required metal gets deposited on the cathode in the pure form.
- ◆ The metal containing impurity goes as the anode mud.

The reactions are



(M = Pure metal, n = 1, 2, 3,)

(OR)

b) How do you explain the process of artificial ripening of fruits by ethylene.

- A:**
- ◆ The starch present in the fruit breaks down to sugar during the process of ripening. The colour of the skin of the fruit also changes.
 - ◆ Ripening of fruits depends upon the season. The plant detects the changes in the season and produce ethylene (C_2H_4) and distributes across the plant.
 - ◆ When ethylene reaches the fruits, it sends signals to all cells in the fruits to make enzymes which breaks starch into sugar.
 - ◆ The cells in the skin of the fruit start making pigments which give colour to the skin of the fruit.

Artificial Ripening:

- ◆ Raw fruits are kept in hay – lined wooden boxes called crates. These crates are stocked on shelves and a wood fire is lit below them.
- ◆ The smoke contains ethylene and acetylene gases which induce ripening.
- ◆ Fruits are placed in a room in which ethylene gas or acetylene gas is introduced.
- ◆ In another method calcium carbide (CaC_2) is applied over fruits. It reacts with moisture to form acetylene, which induces ripening.

PART – B ANSWERS

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

Writer: C.V. SARVESWARA SARMA