



परमाणु ऊर्जा शिक्षण संस्था
Atomic Energy Education Society

आवधिक परीक्षा-II / PT-II Examination 2025- 26

कक्षा / Class: X

अवधि /Duration: 3 Hours

विषय/ Subject: Science (086)

अधिकतम अंक /Maximum Marks: 80

सामान्य निर्देश/ General Instructions:

- (i) This question paper consists of 39 questions in 3 sections. Section A is Biology, Section B is Chemistry and Section C is Physics.
- (ii) All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.

SECTION A

1. Why does increased body complexity in multi-cellular organisms create a challenge for cellular needs? **(1M)**
A. Because all cells grow at the same rate
B. Because not all cells remain in direct contact with the environment
C. Because energy requirements decrease
D. Because tissues stop functioning
2. A plant like *Cuscuta* wraps itself around a host plant and draws nutrients from it without performing photosynthesis. What does this suggest about *Cuscuta*? **(1M)**
A. It is a decomposer
B. It is an autotroph
C. It uses a parasitic mode of nutrition
D. It depends only on sunlight for survival
3. A person smells food, recalls a memory of eating it last week, and starts salivating. Which part of the brain is primarily involved in interpreting this complex response? **(1M)**
A. Hind-brain
B. Mid-brain
C. Spinal cord
D. Fore-brain
4. A scientist observes that a signal reaches almost all cells in a plant, even though plants lack a nervous system. What type of communication is likely responsible for this? **(1M)**
A. Magnetic signals
B. Electrical impulses
C. Hormonal (chemical) signaling
D. Sound vibrations
5. A cell divides and gives rise to two daughter cells. These daughter cells are similar, but not exactly identical. What is the most likely reason for this? **(1M)**
A. The cytoplasm does not divide equally
B. DNA copying involves chemical reactions that may introduce minor variations
C. The new cell uses a different type of food
D. One cell always gets newer organelles
6. If researchers discover a new single-celled organism that reproduces using a method different from binary fission, budding, or multiple fission, what would this imply? **(1M)**
A. All known reproductive methods are invalid.
B. The classification of the organism as unicellular is wrong.
C. Reproductive diversity exists even among unicellular organisms.
D. The organism must be artificially created.
7. During a stressful situation, a person's heartbeat increases and breathing becomes rapid. Which hormone is responsible for this and where is it secreted from? **(1M)**

- A. Insulin – Pancreas
C. Testosterone – Testes

- B. Adrenaline – Adrenal gland
D. Thyroxine – Thyroid gland

The following two questions consist of two statements – **Assertion** (A) and **Reason** (R). Answer these questions by selecting the appropriate option given below:

- A. Both A and R are true, and R is the correct explanation of A.
B. Both A and R are true, and R is not the correct explanation of A.
C. A is true but R is false.
D. A is false but R is true.

8. **Assertion** (A): Alveoli serve as the primary site for exchange of oxygen and carbon dioxide in the lungs. (1M)

Reason (R): Their thin walls and surrounding capillaries enable efficient diffusion of gases.

9. **Assertion** (A): Reflex actions occur without conscious thinking. (1M)

Reason (R): This is because reflex arcs are formed directly in the brain to speed up the response.

10. "Variation is essential for the survival of species over time." Comment upon the statement with justification. (2M)

11. **Students to attempt either option A or B.** (2M)

A. What is the role of nephrons in the human kidney? Name the substances reabsorbed in the nephron and explain why reabsorption is essential.

OR

B. How do plants excrete their waste products? Mention two strategies.

12. Given below is a table comparing two types of plant movements: (2M)

Type of Movement	Growth Involved?	Speed of Movement	Trigger
A. Mimosa leaf folds	No	Fast	Touch
B. Shoot bending towards light	Yes	Slow	Light

Despite lacking nerves and muscles, plants show movement. Using the above data:

- (a) Explain how movement is possible in case A.
(b) Why does movement in case B occur slowly, even though it is also a response?

13. After pollination, the pollen grain undergoes several changes before a seed is formed. (3M)

- (a) Describe the process starting from pollen germination on the stigma up to seed formation.
(b) Draw a labelled diagram of a pollen tube reaching the ovule.

14. Compare the structure and function of hearts in fishes, amphibians, and mammals. How does the number of chambers affect circulatory efficiency? (3M)

15. Some people are advised by doctors to limit sugar intake due to a health condition caused by hormonal imbalance. A hormone secreted by the pancreas plays a key role in regulating blood sugar levels. Its proper secretion is essential for maintaining overall health.

Based on this, answer the following: (**Attempt either A,C,D or B,C,D**) (4M)

A. What is the health condition referred to in the passage, and what is the reason behind it? (2M)

OR

B. Maintaining blood sugar is essential for steady energy supply. What could happen if this balance is disturbed?

C. Name any one food item that should be restricted by individuals with diabetes, and state why it should be avoided. (1M)

D. State the part of the human alimentary canal where the digestion of starch-rich food begins. Name the enzyme responsible for it. (1M)

16. Attempt either option A or B**(5M)**

A. Riya wants to grow a healthy plant at home where there is good sunlight near a window. Her friend Priya explains that while plants make their own food through photosynthesis, proper growth also depends on factors like mineral uptake, gas exchange, and internal functioning. Curious, Riya wants to know how these processes help a plant stay green and healthy.

Answer the following questions based on the case:

- (i) Why might the leaves of Riya's plant droop around noon in summer despite ample sunlight? **(1M)**
- (ii) How does nitrogen help in autotrophic nutrition, and in what form do plants absorb it? **(2M)**
- (iii) If a plant's guard cells do not function properly, how will it affect the plant's photosynthesis and water balance? **(2M)**

OR

B. Ritu noticed that her grandmother could grow beautiful rose and jasmine plants without using seeds. These new plants seemed to grow faster and looked almost identical to the parent plant. Curious, Ritu asked her grandmother about this method and wanted to try it herself. Her grandmother explained that it involved using specific parts of the plant such as stems and roots.

Answer the following questions based on the case:

- (i) Why do you think the new plants grown by Ritu's grandmother looked exactly like the original plant? **(1M)**
- (ii) Mention two advantages of using vegetative propagation for growing flowering plants like rose and jasmine. **(2M)**
- (iii) What suggestions do you think Ritu's grandmother might have given her for successfully growing i) Bryophyllum ii) sugarcane **(2M)**

SECTION B

- 17.** A coastal city reports that iron objects rust much faster compared to those in an inland city. What is the most likely reason for this increased rate of corrosion? **(1M)**
- A. The presence of moisture and salt in coastal air accelerates rusting
 - B. Coastal areas have more oxygen, which reacts faster with iron
 - C. The chemical pollutants in inland air slow down the corrosion process
 - D. Constant coastal winds cause mechanical damage that leads to rust
- 18.** Which of the following will not show any visible change during a chemical reaction? **(1M)**
- A. Heating lead nitrate crystals
 - B. Passing electricity through acidified water
 - C. Adding dil HCl to aqueous solution of NaOH
 - D. Adding dilute HCl to marble chips
- 19.** Which of the following is the correct safety procedure for preparing dilute sulphuric acid in the laboratory? **(1M)**
- A. Add concentrated sulphuric acid quickly to water
 - B. Add water slowly to concentrated sulphuric acid while stirring
 - C. Add concentrated sulphuric acid slowly to water while stirring
 - D. Add water quickly to concentrated sulphuric acid
- 20.** Which pair of solutions will form a precipitate when mixed? **(1M)**
- A. Sodium chloride and potassium nitrate
 - B. Sodium sulphate and barium nitrate

- C. Sodium sulphate and copper (II) nitrate
D. Potassium nitrate and ammonium chloride

21. Which pair of reactants will result in a neutralisation reaction? (1M)

- A. HCl and NaOH B. AgNO₃ and NaCl
C. CuSO₄ and Fe D. Ca(NO₃)₂ and HCl

22. Why is dilute sulphuric acid commonly added to water during the electrolysis of water? (1M)

- A. To neutralize the water B. To cool the electrodes
C. To make water a much better electrical conductor D. To generate more oxygen gas

23. Hydrochloric acid and acetic acid are both 1 M solutions. Which of the following is true regarding the number of hydrogen ions (H⁺) released? (1M)

- A. Both release equal number of H⁺ ions B. HCl releases more H⁺ ions than acetic acid
C. Acetic acid releases more H⁺ ions than HCl D. Neither of them releases H⁺ ions in water

The following question consists of two statements – **Assertion** (A) and **Reason** (R). Answer these questions by selecting the appropriate option given below: (1M)

- A. Both A and R are true, and R is the correct explanation of A.
B. Both A and R are true, and R is not the correct explanation of A.
C. A is true but R is false.
D. A is false but R is true.

24. **Assertion** (A): Food items containing fats and oils are often mixed with antioxidants.

Reason (R): Antioxidants speed up the oxidation of fats to preserve the taste and freshness of food.

25. In an activity, a student burns magnesium ribbon and adds hot water to the white ash formed. On adding phenolphthalein to the solution, it turns pink.

What does the appearance of pink colour indicate about the nature of the ash? Support your answer with a balanced chemical equation. (2M)

26. **Attempt either option A or B.** (3M)

A. Tooth enamel is composed of calcium hydroxyapatite, which is chemically stable under neutral conditions but begins to erode when the pH in the mouth drops below 5.5.

- a) Why does frequent consumption of sugary food increase the likelihood of tooth decay? (1M)
b) How does the basic nature of toothpaste counteract this process? (1M)
c) Suggest one scientifically valid lifestyle habit—other than brushing—that helps maintain the pH of the mouth within a safe range. (1M)

OR

B. Our stomach secretes hydrochloric acid, which aids in digestion without damaging the stomach lining. However, excessive acid production during indigestion causes discomfort. To relieve this, antacids—mild bases such as magnesium hydroxide—are commonly used. (1+1+1M)

- a) Why doesn't hydrochloric acid normally harm the stomach, even though it is a strong acid?
b) Explain the role of antacids in treating indigestion from a chemical perspective.
c) Suggest a reason why antacids are formulated as weak bases instead of strong bases, despite their common goal of neutralizing acid.

27. Part of the pH scale is shown. (3M)

pH		
1	7	14
strongly acidic solution	neutral	strongly alkaline solution

Some of the experiments given below involve a pH change.

A	ammonium chloride is dissolved in pure water
B	sodium carbonate is dissolved in pure water
C	sodium hydroxide solution is neutralised by adding dilute hydrochloric acid
D	excess sodium hydroxide solution is added to a weakly acidic solution
E	ammonia gas is dissolved in pure water

The table below shows the pH at the start and at the end of the five experiments.

Complete the table by inserting the appropriate letter in each box. You may use each letter only once.

The first one has been done for you.

pH at start	pH at end	Experiment
5	14	D
7	6	
7	11	
14	7	
7	12	

28. Corrosion is a natural process that occurs when metals and other materials undergo chemical reactions with their environment, resulting in their gradual deterioration. Corrosion, driven by moisture, oxygen and corrosive substances, hastens metal deterioration, resulting in rust and tarnish. There are many methods to treat metals to avoid or prevent corrosion. Metallic objects around us are actually not made of pure metals. They are called alloys. Alloys enhance the properties of metals and increase their utility manifold.

- Name two which corrode. (1)
- Corrosion can cause serious damage. Explain. (2)
- Explain why Iron Gate at the entrance of an office has become brown and some parts are missing. (1)

OR

Copper vessels turn green on exposure to atmosphere. Name the phenomenon.

29. Attempt either option A or B. (5M)

A. A salt **X**, widely used in bakery products, decomposes on heating to form another salt **Y** and a gas **Z**. Salt **Y** is commonly used for the removal of permanent hardness of water. When gas **Z** is bubbled through lime water, a milky white precipitate of **M** is formed. However, upon passing excess gas **Z**, the milkiness disappears due to the formation of **N**, a soluble compound. When this clear solution is heated strongly, it evaporates to dryness, leaving behind solid **M** once again.

- Identify: Substances **X**, **Y**, **Z**, **M**. (2+3M)
- Write balanced chemical equations for:
 - The thermal decomposition of **X**.
 - The reaction of **Z** with lime water forming **M**.
 - The formation of **N** on excess passage of **Z**.

OR

B. Compound **X**, a commonly used base, dissolves readily in water with the release of heat. When exposed to air, **X** absorbs moisture and reacts with carbon dioxide to form compound **Y**. Hence, **X** needs to be stored properly in airtight containers.

X is also a by-product of the chlor-alkali process. When **X** reacts with zinc, it forms compound **Z** and hydrogen gas. It also reacts with dilute hydrochloric acid to form compound **M** and water. Its reaction with aluminium metal produces significant heat and gas, and is used in some commercial drain cleaning products. In another test, **X** reacts with copper sulphate solution to form a blue precipitate, **N**.

- a) Identify compounds **X**, **Y**, **Z**, **M**
- b) Write balanced chemical equations for:
 - (i) The formation of **Y** from **X** and CO_2
 - (ii) The reaction of **X** with zinc
 - (iii) The reaction of **X** with dilute hydrochloric acid

SECTION C

30. A convex lens forms a real, inverted image of magnification -1 . Where is the object placed?(**1M**)

- (a) At F (b) Between F and $2F$ (c) At $2F$ (d) Beyond $2F$

31. Why does the apparent position of an object fluctuate when viewed through hot air rising from a surface? (**1M**)

- A) Due to scattering of light
B) Because the air acts like a mirror
C) Because of continuous change in the density and refractive index of the rising air
D) Because light slows down in hot air

The following two questions consist of two statements – **Assertion (A)** and **Reason (R)**. Answer these questions by selecting the appropriate option given below:

- A. Both **A** and **R** are true, and **R** is the correct explanation of **A**.
B. Both **A** and **R** are true, and **R** is not the correct explanation of **A**.
C. **A** is true but **R** is false.
D. **A** is false but **R** is true.

32. Assertion (A): Letters placed under a thick glass slab appear raised.

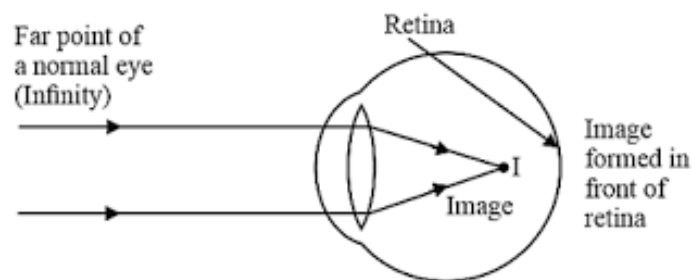
Reason (R): Glass is transparent and allows all light to pass through it without deviation. (**1M**)

33. A beam of light enters obliquely from air into two different transparent media **A** and **B**. In medium **A**, the light bends closer to the normal than in medium **B**. Without using any values, predict which medium has a higher refractive index. Justify your answer using the laws of refraction. (**2M**)

34. Attempt either option A or B

(**2M**)

- A.** Observe the figure showing a myopic (short-sighted) eye attempting to focus on a distant object.



- (i) Name the type of lens used to correct this defect.
- (ii) With reference to the given figure, draw a neat labeled ray diagram to show how myopia is corrected using an appropriate lens.

OR

- B.** Ravi, who finds it difficult to read books at a normal reading distance, holds his book much farther away. Based on your understanding of this defect, explain what is happening inside his eye. Draw a ray diagram to show how this defect can be corrected using a suitable lens.
- 35.** A student directs a ray of light toward the centre of curvature of, (a) a concave mirror, and (b) a convex mirror. In both cases, the ray is reflected back along the same path. **(3M)**
- (i) Explain why this happens in both cases, even though the mirrors are of different types.
 - (ii) How does this behaviour help in identifying whether a given curved mirror is concave or convex, if only the reflected ray path is observed?
 - (iii) What would happen if the same ray were slightly tilted so that it no longer points exactly at the centre of curvature?
- 36.** Explain the roles of refraction, dispersion, and total internal reflection in the formation of a primary rainbow. **(3M)**
- 37.** Arjun was confused when he heard someone say that the retina is more important for vision than the eye lens. He thought the lens does all the focusing and should be the most important part. Justify scientifically why the retina is considered more crucial for vision than the lens. **(3M)**
- 38. A.** A student places an object far beyond $2F$ on the principal axis of a convex lens. The image formed is real, inverted, and smaller. If the student moves the object gradually towards $2F$, what changes do you expect in the size and position of the image? **(1+2+1M)**

Attempt either subpart B or C

- B.** A teacher tells her class that “Placing an object exactly at the focus of a convex lens gives no image.” Do you agree or disagree? Use a ray diagram and reasoning to support your conclusion.

OR

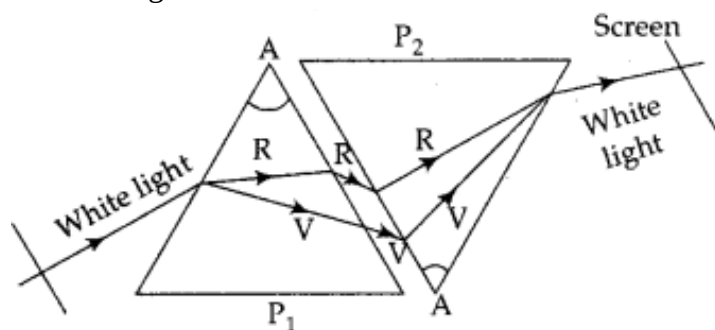
- C.** A concave lens always forms an image that is erect and smaller than the object. Using your understanding of how light rays behave through a concave lens, explain why this is true for any position of the object.

- D.** Why can't a concave lens be used in a camera to project an image on the film or sensor?

- 39. Attempt either option A or B.** **(5M)**

- A.** (i) Light passing through a rectangular glass slab emerges parallel to the incident ray but is laterally displaced. How is the refraction of light through a transparent prism different from that through a rectangular slab? Explain the path and nature of the emergent ray in both cases. **(2M)**

- (ii) The diagram shows two identical prisms, P_1 and P_2 , arranged such that white light enters prism P_1 , gets dispersed into a spectrum, and then passes through prism P_2 , after which a white light beam emerges. (2M)



Explain why white light emerges from prism P_2 instead of a spectrum.

- (iii) Which colour in white light travels fastest in a glass prism? (1M)

OR

- B.** (i) How do refraction and scattering together influence sky colour at sunrise/sunset? (1M)
 (ii) If the Earth's atmosphere were completely still and uniform, how would the visibility of stars at night change? (2M)
 (iii) While visiting a hill station, Aman notices that the headlights of cars appear like bright visible beams in the early morning mist. Explain the phenomenon responsible for this observation. What does this tell us about the atmosphere in such areas? (2M)
