

Aarav  
Gupta  
X-E

**S2**  
**Pre Board Examination, 2023-2024**  
**Subject: Science**  
**Set-2**

Time Duration: 3 hours

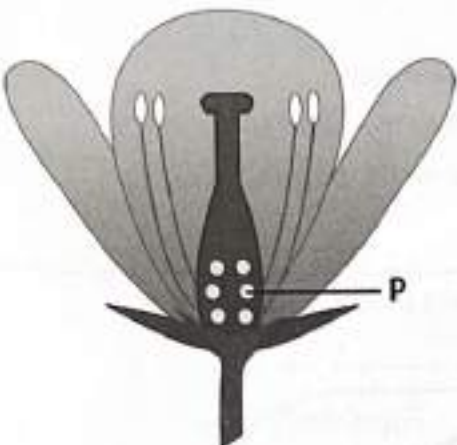
M.M. 80

1. This question paper consists of 39 questions in 5 sections.
2. All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.
3. Section A consists of 20 objective type questions carrying 1 mark each.
4. Section B consists of 6 Very Short questions carrying 02 marks each. Answers to these questions should be in the range of 30 to 50 words.
5. Section C consists of 7 Short Answer type questions carrying 03 marks each. Answers to these questions should be in the range of 50 to 80 words.
6. Section D consists of 3 Long Answer type questions carrying 05 marks each. Answers to these questions should be in the range of 80 to 120 words.
7. Section E consists of 3 source-based/case-based units of assessment of 04 marks, each with sub-parts.

Section A		1 X 20 = 20
1.	Which one of the following processes involve chemical reaction? (a) Storing of oxygen gas under pressure in a gas cylinder. (b) Liquefaction of air (c) Keeping petrol in a china dish in the open. (d) Heating copper wire in the presence of air at high temperature.	1
2.	Which of the following reactions are combination reactions? (i) $2\text{KClO}_3 \xrightarrow{\text{Heat}} 2\text{KCl} + 3\text{O}_2$ (ii) $\text{MgO} + \text{H}_2\text{O} \longrightarrow \text{Mg}(\text{OH})_2$ (iii) $4\text{Al} + 3\text{O}_2 \longrightarrow 2\text{Al}_2\text{O}_3$ (iv) $\text{Zn} + \text{PbSO}_4 \longrightarrow \text{ZnSO}_4 + \text{Pb}$ (a) (i) and (iii) (b) (iii) and (iv) (c) (ii) and (iv) (d) (ii) and (iii)	1

3.	<p>Which of the following is incorrectly matched?</p> <table border="1"> <thead> <tr> <th>Options</th> <th>Acid</th> <th>Source</th> </tr> </thead> <tbody> <tr> <td>a</td> <td>Orange</td> <td>Citric acid</td> </tr> <tr> <td>b</td> <td>Tamarind</td> <td>Tartaric acid</td> </tr> <tr> <td>c</td> <td>Lemon</td> <td>Lactic acid</td> </tr> <tr> <td>d</td> <td>Tomato</td> <td>Oxalic acid</td> </tr> </tbody> </table>	Options	Acid	Source	a	Orange	Citric acid	b	Tamarind	Tartaric acid	c	Lemon	Lactic acid	d	Tomato	Oxalic acid	1
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a	Orange	Citric acid															
b	Tamarind	Tartaric acid															
c	Lemon	Lactic acid															
d	Tomato	Oxalic acid															
4.	<p>Which of the following statements is correct about an aqueous solution of an acid and a base ?</p> <p>(i) Higher the pH, stronger the acid.  (ii) Higher the pH, weaker the acid.  (iii) Lower the pH, stronger the base.  (iv) Lower the pH ,weaker the base.</p> <p>(a) (i) and (iii)  (b) (ii) and (iii)  (c) (i) and (iv)  (d) (ii) and (iv)</p>	1															
5.	<p>The reaction of calcium with water is less violent. The heat evolved is not sufficient for the hydrogen to catch fire. However some metals react very violently with cold water.</p> <p>Which ones of the following metals react violently with cold water ?</p> <p>(a) Sodium, potassium and magnesium.  (b) Aluminium and magnesium.  (c) Sodium and potassium.  (d) Sodium, potassium and aluminium</p>	1															

6.	<p>Generally metals are ductile and good conductors of heat and electricity. Which one of the following metals are the best conductors of heat ?</p> <p>(a) Gold and silver.</p> <p>(b) Aluminum and Iron.</p> <p>(c) Silver and copper.</p> <p>(d) Lead and mercury.</p>	1
7.	<p>What happens to the insoluble impurities during refining of a metal by electrolysis ?</p> <p>(a) Insoluble impurities go into the solution.</p> <p>(b) Insoluble impurities settle below the cathode.</p> <p>(c) Insoluble impurities settle below the anode.</p> <p>(d) None of the above.</p>	1
8.	<p>The following image shows the bread mould on bread:</p> <div> </div> <p>How do these fungi obtain nutrition?</p> <p>a. By eating the bread on which it is growing</p> <p>b. By using nutrients from the bread to prepare their own food</p> <p>c. By breaking down the nutrients of bread and then absorbing them</p> <p>d. By allowing other organisms to grow on the bread and then consuming them</p>	1

9.	<p>The growth of tendrils in pea plants is due to _____.</p> <ol style="list-style-type: none"> <li>Effect of gravity</li> <li>Effect of chemicals</li> <li>Rapid cell divisions in <i>cells of tendrils</i> that are away from support</li> <li>Rapid cell division in <i>cells of tendrils</i> in contact with the support</li> </ol>	1
10.	<p>The image shows the structure of a flower.</p>  <p>Which of the following processes will likely be disturbed or not occur if the labeled part is removed from the flower?</p> <ol style="list-style-type: none"> <li>Formation of fruit</li> <li>Transport of pollen</li> <li>Formation of pollen</li> <li>Development of the pollen tube</li> </ol>	1
11.	<p>A zygote which has an X chromosome inherited from the father will develop into</p> <ol style="list-style-type: none"> <li>Boy</li> <li>Girl</li> <li>X chromosome does not determine the sex of a child</li> <li>Either boy or girl</li> </ol>	1

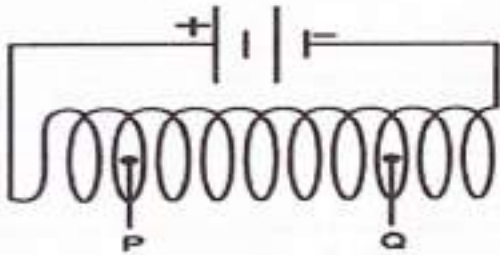


12.	<p>What is common between the extensive network of blood vessels around walls of alveoli and in the glomerulus of nephron?</p> <p>a. Thick walled arteries richly supplied with blood</p> <p>b. Thin walled veins poorly supplied with blood</p> <p>c. Thick walled capillaries poorly supplied with blood.</p> <p>d. Thin walled capillaries richly supplied with blood</p>	1
13.	<p>The angle of incidence from air to glass at point O on the hemispherical glass slab is _____.</p> <p>a. <math>45^\circ</math></p> <p>b. <math>0^\circ</math></p> <p>c. <math>90^\circ</math></p> <p>d. <math>180^\circ</math></p> <div style="text-align: center;"> </div>	1
14.	<p>The image distance from the eye lens in the normal eye when we increase the distance of an object from the eye:</p> <p>a. Increases.</p> <p>b. Decreases.</p> <p>c. Remains unchanged.</p> <p>d. Depends on the size of eyeball</p>	1
15.	<p>In terms of food chain, which of the following belongs to the same trophic level?</p> <p>a. Snake and grass</p> <p>b. Grass and tree</p> <p>c. Lizard and elephant</p> <p>d. Bacteria and grass</p>	1

16.	<p>A food chain involves Flower → Caterpillar → Frog → Snake → Owl.</p> <p>If all the owls are removed from this food chain then which of the following options is correct?</p> <p>a. Number of caterpillars will decrease greatly.</p> <p>b. Population of frogs will decrease apparently.</p> <p>c. Population of snakes will increase greatly.</p> <p>d. Both B and C</p>	
	<p>The following questions from Question 4 to Question 6 consist of two statements – Assertion (A) and Reason (R) Answer these questions selecting the appropriate option given below:</p> <p>(a) Both A and R are true and R is the correct explanation of A</p> <p>(b) Both A and R are true and R is not the correct explanation of A</p> <p>(c) A is true but R is false</p> <p>(d) A is False but R is true</p> <p>(e) Both A and R are false</p>	
17.	<p><b>Assertion :</b> Carbon cannot reduce the oxides of sodium, magnesium, calcium, aluminium to the respective metals.</p> <p><b>Reason:</b> Sodium, magnesium, calcium and aluminium have more affinity for oxygen than carbon.</p>	1
18.	<p><b>Assertion:</b> Ozone is formed in the atmosphere by O<sub>2</sub> in presence of UV radiations.</p> <p><b>Reason:</b> Ozone depletion will lead to UV rays reaching earth which may cause skin cancer.</p>	1
19.	<p><b>Assertion:</b> Alternating Current is used in household supply.</p> <p><b>Reason:</b> AC electric power can be transmitted over long distances without much loss of energy.</p>	1
20.	<p><b>Assertion:</b> Spores are unicellular bodies</p> <p><b>Reason:</b> The blob like head (sporangium) breaks open to release many tiny spores in Rhizopus.</p>	1

## Section B

2 X 6 = 12

21.	(a) Write a balanced chemical equation with states for the reaction which is prevented by storing silver chloride away from sunlight. <i>This reaction is also used in black and white photography.</i> (b) Identify the type of reaction that is prevented.	2
22.	State the post-fertilisation changes that lead to fruit formation in plants	2
23.	Differentiate between the type of circulation found in fish and birds. <b>OR</b> Mention any four strategies for excretion in plants.	2
24.	a. State one difference between kilowatt and kilowatt hour. b. A bulb is rated 5V; 500 mA. Calculate the rated power and resistance of the bulb when it glows.	2
25.	'n' resistors each of resistance R are first connected in series and then in parallel. What is the ratio of the total effective resistance of the circuit in series combination and parallel combination? <b>OR</b> A helical coil whose length is greater than its diameter is connected to a battery as shown below.  a. How does the magnetic field at point P compare with the magnetic field at point Q? Justify your answer. b. State one way in which the strength of the magnetic field inside a current carrying helical coil can be changed?	2

26. Study the food chain given below and answer the questions that follow: 2

a. If the amount of energy available at the third trophic level is 100 joules, then how much energy will be available at the producer level? Justify your answer

b. Why are food chains generally no longer than 4 to 5 trophic levels?

**Section C**

**3 X 7 = 21**

27. Equal sized pieces of three metals Iron, Copper and Silver are exposed to the environment. It was found that after a few days of exposure to air iron turns brown, Copper turns green and silver turns black. Name the chemical compounds formed which causes the exposed metals to acquire these colours on their surfaces. 3

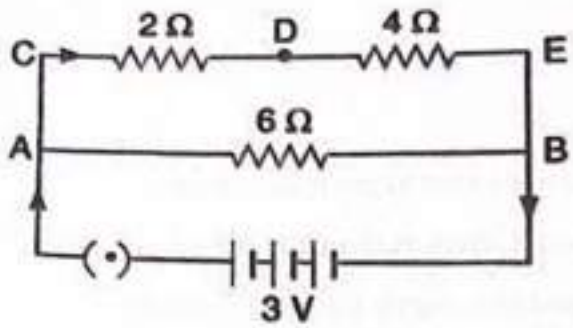
28. **OPTION 1** 3

The electronic configuration of some elements is given in the table below.

Element	Atomic number	Number of electrons in the shell/ <i>Electronic Configuration</i>
Helium	2	2
Magnesium	12	2,8,2
Chlorine	17	2,8,7
Argon	18	2,8,8



	<p>(a) Identify one pair of element that will react to form a compound by transfer of electrons.</p> <p>(b) Write the electron dot structures for these two elements.</p> <p>(c) Show the formation of the compound by these two elements by the transfer of Electrons.</p> <p style="text-align: center;"><b>OR</b></p> <p><b>OPTION 2</b></p> <p>Compound X and aluminium are used to join railway tracks.</p> <p>(a) Identify the compound X. Write its chemical name and formula.</p> <p>(b) Name the reaction and also identify the type of reaction.</p> <p>(c) Write down the balanced chemical equation with states for this reaction.</p>	
29.	How is the movement of leaves of a sensitive plant different from the movement of a shoot towards light?	3
30.	<p>A blue colour flower plant denoted by BB is crossbred with that of white colour flower plant denoted by bb.</p> <p>a. State the colour of flower you would expect in their F1 generation plants. (1)</p> <p>b. What must be the percentage of white flower plants in F2 generation if flowers of F1 plants are self-pollinated? Show with the help of a cross. (2)</p>	3
31.	<p>If the image formed by a lens for all positions of an object placed in front of it is always erect and diminished, what is the nature of this lens? Draw a ray diagram to justify your answer.</p> <p>If the numerical value of the power of this lens is 10 D, what is its focal length in the Cartesian system?</p>	3

32.	<p>In the circuit shown below, calculate:</p> <ol style="list-style-type: none"> <li>Total resistance in arm CE,</li> <li>Total current drawn from the battery, and</li> <li>Current in each arm, i.e., AB and CE of the circuit</li> </ol> 	3
33.	<ol style="list-style-type: none"> <li>Why does a current-carrying conductor experience a force when it is placed in a magnetic field?</li> <li>How will a fine beam of electrons streaming in west to east direction be affected by a magnetic field directed vertically upwards? Explain with the help of the rule applied.</li> </ol>	3
<b>Section D</b>		<b>5 X 3 = 15</b>
34.	<p><b>OPTION-1</b></p> <p>A student heated Ethanol with a compound A which has a molecular formula <math>C_2H_4O_2</math>, in the presence of a few drops of concentrated sulphuric acid. It was observed that a sweet smelling compound B is formed.</p> <ol style="list-style-type: none"> <li>Identify A and B. <span style="float: right;">(<math>\frac{1}{2} + \frac{1}{2}</math>)</span></li> <li>What is the name of this reaction? <span style="float: right;">(1)</span></li> <li><del>(c)</del> Give two uses of the compound B. <span style="float: right;">(1+1)</span></li> <li><del>(d)</del> Write the chemical reaction involved. <span style="float: right;">(1)</span></li> </ol>	5

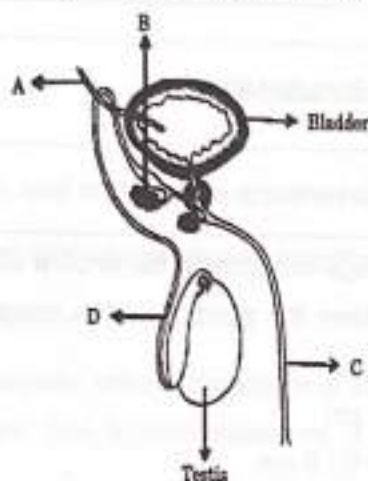
OR

**OPTION 2**

- (a) What is the role of concentrated Sulphuric acid when it is heated with Ethanol at 443 K. Give the reaction involved. (1+1)
- (b) A student by mistake forgot to label the two test tubes containing Ethanol and Ethanoic acid. How will the student identify these substances experimentally? Also write the chemical equation for the same. (1+1)
- (c) Write any one use of ethanol. (1)

35. Based on the given diagram answer the questions given below:

5

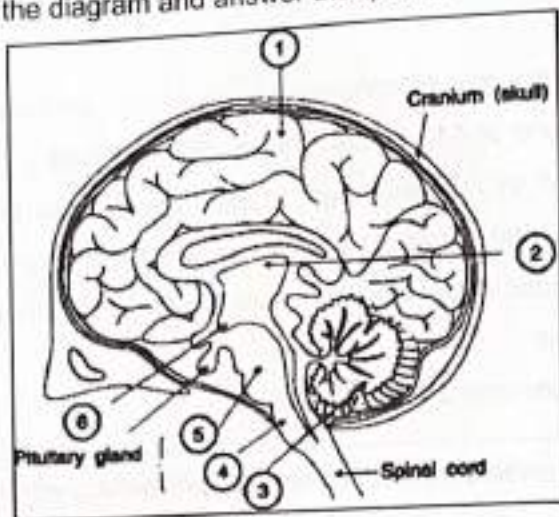


- a. Label the parts A, B, C and D.
- b. Name the hormone secreted by testis and mention its role.
- c. State the functions of B and C in the process of reproduction.

OR

- a. Name the hormone required for the following. Also mention the name of endocrine gland from which that hormone is secreted:
- (i) Lowering of blood glucose.
- (ii) Regulation of menstrual cycle
- (iii) Metabolism of carbohydrates, fats and proteins

b. Observe the diagram and answer the questions that follow



Mention the functions associated with

- i. Structure 3
- ii. Structure 6

- |    |   |   |
|----|---|---|
| 36 | <p>A student focused the image of a candle flame on a white screen using a convex lens. He noted down the position of the candle, screen and the lens as under ,</p> <p>Position of candle = 12.0 cm<br/>Position of convex lens = 50.0 cm<br/>Position of the screen = 88.0 cm</p> <ol style="list-style-type: none"><li>a. What is the focal length of the convex lens?</li><li>b. Where will the image be formed if he shifts the candle towards the lens at a position of 31.0 cm?</li><li>c. What will be the nature of the image formed if he further shifts the candle towards the lens?</li><li>d. Draw a ray diagram to show the formation of the image in case (c) as said above.</li></ol> | 5 |
|----|---|---|



36.	<p style="text-align: center;"><b>OR</b></p> <p>A student wants to project the image of a candle flame on a screen 80 cm in front of a mirror by keeping the candle flame at a distance of 20 cm from its pole.</p> <ol style="list-style-type: none"> <li>Which type of mirror should the student use?</li> <li>Find the magnification of the image produced.</li> <li>Find the distance between the object and its image.</li> <li>Draw a ray diagram to show the image formation in this case and mark the distance between the object and its image.</li> </ol>	5
<b>Section E</b>		<b>4 X 3 = 12</b>
37.	<p><b>Read the passage and answer the questions that follow:</b></p> <p>Given below is a six carbon skeleton of a hydrocarbon compound:</p> <p style="text-align: center;">—C—C—C—C—C—C—</p> <p>The carbon compounds which contain only carbon and hydrogen are called hydrocarbons. The hydrocarbons are of two types, saturated and unsaturated.</p> <ol style="list-style-type: none"> <li>Fill in the hydrogen atoms/bonds to form a saturated hydrocarbon. (1)</li> <li> <ol style="list-style-type: none"> <li>Draw all structures possible for this six carbon, saturated hydrocarbon. (½ x 5)</li> <li>What is the relation between all the possible structures of this six carbon saturated hydrocarbon known as? (½)</li> </ol> </li> </ol> <p style="text-align: center;"><b>OR</b></p>	4

	<p>(b) If this six carbon skeleton is of a straight chained unsaturated double bond hydrocarbon then:</p> <p>(i) What will be the name and the molecular formula of the hydrocarbon. (1+1)</p> <p>(ii) Write the name of the first member of this unsaturated double bond hydrocarbon series. (1)</p>									
38.	<p><b>Read the passage and answer the questions that follow:</b></p> <p>Refer to the given table regarding results of F<sub>2</sub> generation of Mendelian cross and answer the questions that follow:</p> <table border="1"> <tr> <td>Plants with round and yellow coloured seeds (P)</td> <td>315</td> </tr> <tr> <td>Plants with round and green coloured seeds (Q)</td> <td>108</td> </tr> <tr> <td>Plants with wrinkled and yellow coloured seeds (R)</td> <td>101</td> </tr> <tr> <td>Plants with wrinkled and green coloured seeds (S)</td> <td>32</td> </tr> </table> <p>a. Mention the phenotype of F<sub>1</sub> generation in such situation. (1)</p> <p>b. Represent the data in the form of suitable cross and represent the F<sub>2</sub> phenotypic ratio. (2)</p> <p>c. Which Mendelian law is exclusively depicted by such F<sub>2</sub> phenotypic ratio? (1)</p> <p style="text-align: center;"><b>OR</b></p> <p>How do germ cells make a single set of genes from the normal two copies that all other cells in the body have? (1)</p>	Plants with round and yellow coloured seeds (P)	315	Plants with round and green coloured seeds (Q)	108	Plants with wrinkled and yellow coloured seeds (R)	101	Plants with wrinkled and green coloured seeds (S)	32	4
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39.	<p>The ability of a medium to refract light is expressed in terms of its optical density. Optical density has a definite connotation. It is not the same as mass density. On comparing two media, the one with the large refractive index is optically denser medium than the other. The other medium with a lower refractive index is optically rarer. Also the speed of light through a given medium is inversely proportional to its optical density</p> <p>a. Determine the speed of light in diamond if the refractive index of diamond with respect to vacuum is 2.42. The speed of light in vacuum is <math>3 \times 10^8</math> m/s. (1)</p> <p>b. Refractive indices of glass, water and carbon disulphide are 1.5, 1.33 and 1.62 respectively. If a ray of light is incident in these media at the same angle (say <math>\theta</math>), then write the increasing order of the angle of refraction in these media. (1)</p> <p>c. The speed of light in glass is <math>2 \times 10^8</math> m/s and in water is <math>2.25 \times 10^8</math> m/s.</p> <p>(i) Which one of the two is optically denser and why?</p> <p>(ii) A ray of light is incident normally at the water-glass interface when it enters a thick glass container filled with water. What will happen to the path of the ray after entering the glass?</p> <p>Give reasons (2)</p> <p style="text-align: center;"><b>OR</b></p> <p>The absolute refractive indices of water and glass are <math>\frac{4}{3}</math> and <math>\frac{3}{2}</math> respectively. If the speed of light in glass is <math>2 \times 10^8</math> m/s, find the speed of light in (i) vacuum and (ii) water</p>	4
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