

### **General Instructions :**

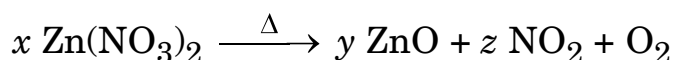
*Read the following instructions very carefully and strictly follow them :*

- (i) *This question paper comprises **39** questions. **All** questions are compulsory.*
- (ii) *This question paper is divided into **five** sections – **A, B, C, D** and **E**.*
- (iii) ***Section A** – Questions No. **1** to **20** are multiple choice questions. Each question carries **1** mark.*
- (iv) ***Section B** – Questions No. **21** to **26** are very short answer type questions. Each question carries **2** marks. Answer to these questions should be in the range of **30 to 50** words.*
- (v) ***Section C** – Questions No. **27** to **33** are short answer type questions. Each question carries **3** marks. Answer to these questions should be in the range of **50 to 80** words.*
- (vi) ***Section D** – Questions No. **34** to **36** are long answer type questions. Each question carries **5** marks. Answer to these questions should be in the range of **80 to 120** words.*
- (vii) ***Section E** – Questions No. **37** to **39** are of 3 source-based/case-based units of assessment carrying **4** marks each with sub-parts.*
- (viii) *There is no overall choice. However, an internal choice has been provided in some sections. Only one of the alternatives has to be attempted in such questions.*

### **SECTION A**

*Select and write the most appropriate option out of the four options given for each of the questions no. **1** to **20**.* *20×1=20*

- 1.** To balance the following chemical equation, the values of the coefficients  $x$ ,  $y$  and  $z$  must be respectively :



(A) 4, 2, 2

(B) 4, 4, 2

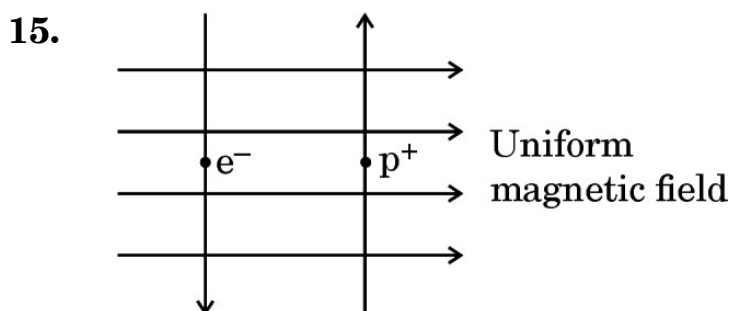
(C) 2, 2, 4

(D) 2, 4, 2

2. Which of the following is a redox reaction, but **not** a combination reaction ?
- (A)  $C + O_2 \rightarrow CO_2$  (B)  $2 H_2 + O_2 \rightarrow 2 H_2O$   
(C)  $2 Mg + O_2 \rightarrow 2 MgO$  (D)  $Fe_2O_3 + 3 CO \rightarrow 2 Fe + 3 CO_2$
3. The salt present in tooth enamel is :
- (A) Calcium phosphate (B) Magnesium phosphate  
(C) Sodium phosphate (D) Aluminium phosphate
4. An aqueous solution of sodium chloride is prepared in distilled water. The pH of this solution is :
- (A) 6 (B) 8  
(C) 7 (D) 3
5. A metal 'X' is used in thermit process. When 'X' is heated with oxygen, it gives an oxide 'Y', which is amphoteric in nature. 'X' and 'Y' respectively are :
- (A) Mn,  $MnO_2$  (B) Al,  $Al_2O_3$   
(C) Fe,  $Fe_2O_3$  (D) Mg, MgO
6. The process in which transport of soluble products of photosynthesis takes place in plants is known as :
- (A) Transpiration (B) Evaporation  
(C) Conduction (D) Translocation
7. The correct sequence of events when someone's hand touches a hot object unconsciously :
- (A) Receptors in skin  $\rightarrow$  Motor neuron  $\rightarrow$  Relay neuron  $\rightarrow$  Sensory neuron  $\rightarrow$  Effector muscle in arm  
(B) Receptors in skin  $\rightarrow$  Relay neuron  $\rightarrow$  Sensory neuron  $\rightarrow$  Motor neuron  $\rightarrow$  Effector muscle in arm  
(C) Receptors in skin  $\rightarrow$  Sensory neuron  $\rightarrow$  Relay neuron  $\rightarrow$  Motor neuron  $\rightarrow$  Effector muscle in arm  
(D) Receptors in skin  $\rightarrow$  Sensory neuron  $\rightarrow$  Effector muscle in arm  $\rightarrow$  Motor neuron  $\rightarrow$  Relay neuron

8. Sense organ in which olfactory receptors are present is :
- (A) Nose
  - (B) Skin
  - (C) Tongue
  - (D) Inner ear
9. The **incorrect** statement about placenta is :
- (A) It is a disc embedded in the uterine wall.
  - (B) It contains villi on the embryo's side of the tissue.
  - (C) It has a very small surface area for glucose and oxygen to pass from mother to the embryo.
  - (D) The embryo gets nutrition from the mother's blood through it.
10. Select from the following the conditions responsible for the rapid spread of bread mould on a slice of bread :
- (i) Formation of large number of spores
  - (ii) Presence of moisture and nutrients in bread
  - (iii) Low temperature
  - (iv) Presence of hyphae
- (A) (i) and (ii)
  - (B) (ii) and (iv)
  - (C) (ii) and (iii)
  - (D) (iii) and (iv)
11. How will the image formed by a convex lens be affected, if the upper half of the lens is wrapped with a black paper ?
- (A) The size of the image formed will be one-half of the size of the image due to complete lens.
  - (B) The image of upper half of the object will not be formed.
  - (C) The brightness of the image will reduce.
  - (D) The lower half of the inverted image will not be formed.

12. The phenomena of light involved in the formation of rainbow are :
- Refraction, reflection and dispersion
  - Refraction, dispersion and internal reflection
  - Reflection, dispersion and internal reflection
  - Refraction, dispersion, scattering and total internal reflection
13. The colour of light for which the refractive index of glass is minimum, is :
- Red
  - Yellow
  - Green
  - Violet
14. The current carrying device which produces a magnetic field similar to that of a bar magnet is :
- A straight conductor
  - A circular loop
  - A solenoid
  - A circular coil



A uniform magnetic field exists in the plane of paper as shown in the diagram. In this field, an electron ( $e^-$ ) and a positron ( $p^+$ ) enter as shown. The electron and positron experience forces :

- both pointing into the plane of the paper.
  - both pointing out of the plane of the paper.
  - pointing into the plane of the paper and out of the plane of the paper respectively.
  - pointing out of the plane of the paper and into the plane of the paper respectively.
16. Which one of the following is **not** a natural ecosystem ?
- Pond ecosystem
  - Grassland ecosystem
  - Forest ecosystem
  - Cropland ecosystem

***For Questions number 17 to 20, two statements are given — one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below.***

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

**17.** *Assertion (A) :* Some vegetable oils are healthy.

*Reason (R) :* Vegetable oils generally have long unsaturated carbon chains.

**18.** *Assertion (A) :* Sex of the children will be determined by what they inherit from their mother.

*Reason (R) :* Women have XX sex chromosomes.

**19.** *Assertion (A) :* Electrons move from lower potential to higher potential in a conductor.

*Reason (R) :* A dry cell maintains electric potential difference across the ends of a conductor.

**20.** *Assertion (A) :* Ozone layer protects the surface of the Earth from harmful UV radiations.

*Reason (R) :* Chlorofluorocarbons (CFCs) are responsible for depletion of ozone layer.

## SECTION B

Questions no. **21** to **26** are very short answer type questions.

- 21.** (a) Copper powder is taken in a china dish and heated over a burner. Name the product formed and state its colour. Write the chemical equation for the reaction involved. 2

**OR**

- (b) Write chemical equation for the chemical reaction which occurs when the aqueous solutions of barium chloride and sodium sulphate react together. Write the symbols of the ions present in the compound precipitated in the reaction. 2
- 22.** The melting and boiling points of carbon compounds are generally low and they are largely non-conductors of electricity. State two conclusions based on these two properties. 2
- 23.** (a) Sometimes while running, the athletes suffer from muscle cramps. Why ? How is the respiration in this case different from aerobic respiration ? 2

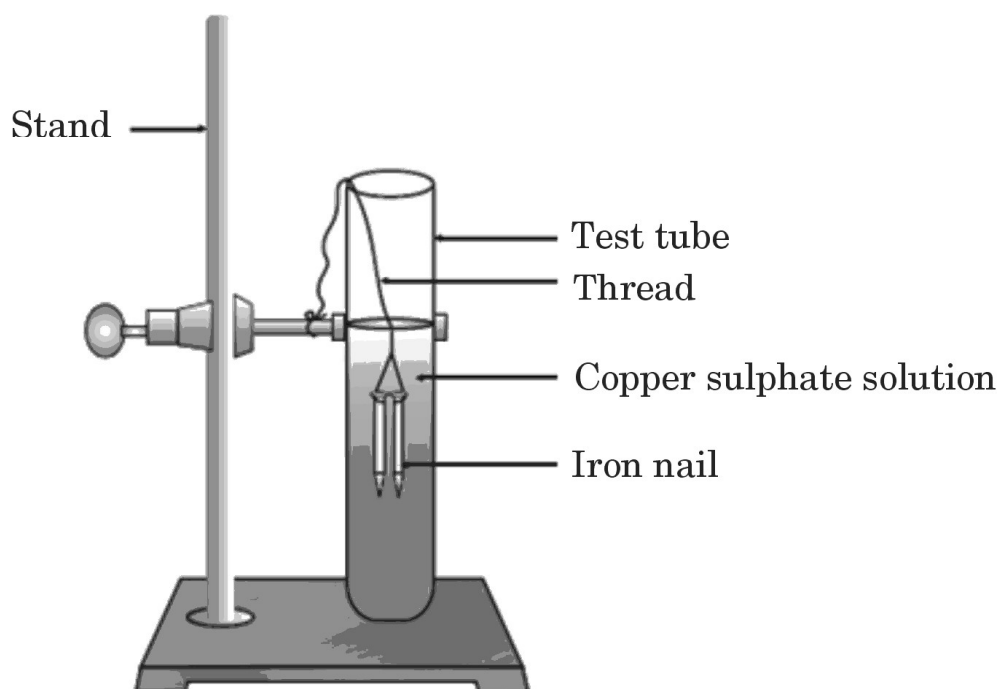
**OR**

- (b) Write the other name given to lymph. State its two functions. 2
- 24.** Some unicellular organisms such as Plasmodium and Leishmania differ in the manner in which they reproduce. Name and explain the reproductive process taking place in them. 2
- 25.** The heat produced at a point due to concentration of sunlight by a convex lens burns a paper.
- (a) Explain why it happens.
- (b) Name the term (in the context of the lens used) given to the point at which the paper starts burning. What does the bright spot formed on the paper represent ? 2
- 26.** An electric source can supply a charge of 500 coulomb. If the current drawn by a device is 25 mA, find the time in which the electric source will be discharged completely. 2

## SECTION C

Questions no. 27 to 33 are short answer type questions.

27.



Study the experimental set-up shown in the diagram and write chemical equation for the chemical reaction involved. Name and define the type of reaction. List two other metals which can be used in place of iron to show the same type of reaction with copper sulphate solution.

3

28. Name the ore of mercury and state the form in which it is found in nature. Write the chemical equations along with the condition required for the reactions involved in the extraction of mercury from its ore.

3

29. Taking the example of any two animal hormones along with their gland of secretion, explain how these hormones help (i) in growth and development and (ii) regulate metabolism, in the body.

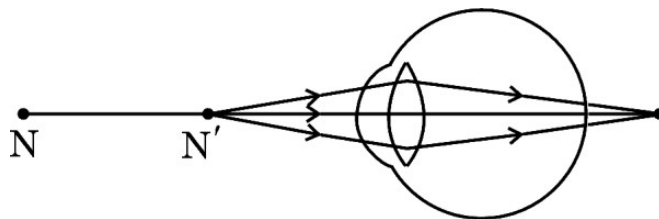
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30. Mendel crossed pure tall pea plants (TT) with pure short pea plants (tt) and obtained  $F_1$  progeny. When the plants of  $F_1$  progeny were self-pollinated, plants of  $F_2$  progeny were obtained.

- What did the plants of  $F_1$  progeny look like ? Give their gene combination.
- Why could the gene for shortness not be expressed in plants of  $F_1$  progeny ?
- Write the ratio of the plants obtained in  $F_2$  progeny and state the conclusion that can be drawn from this experiment.

3

- 31.** (a) Study the diagram given below and answer the questions that follow :



- (i) Name the defect of vision depicted in this diagram stating the part of the eye responsible for this condition.
- (ii) List two causes of this defect.
- (iii) Name the type of lens used to correct this defect and state its role in this case.

3

**OR**

- (b) What is dispersion of white light ? State its cause. Draw a diagram to show dispersion of a beam of white light by a glass prism.

3

- 32.** (a) What happens when a bundle of wires of soft iron is placed inside the coil of a solenoid carrying a steady current ? Name the device obtained. Why is it called so ?

- (b) Draw the magnetic field lines inside a current carrying solenoid. What does this pattern of magnetic field lines indicate ?

3

- 33.** Differentiate between food chain and food web. In a food chain consisting of deer, grass and tiger, if the population of deer decreases, what will happen to the population of organisms belonging to the first and third trophic levels ?

3



## SECTION D

Questions no. 34 to 36 are long answer type questions.

34. (a) A few crystals of ferrous sulphate were taken in a dry boiling tube and heated. Tiny water droplets were observed in the tube after some time.
- (i) From where did these water droplets appear ? Explain.
  - (ii) What colour change will be observed during heating ?
  - (iii) How many molecules of water are attached per molecule of  $\text{FeSO}_4$  crystal ? Write the molecular formula of crystalline forms of (I) Copper sulphate, and (II) Sodium carbonate.
  - (iv) State how is Plaster of Paris obtained from gypsum. Write two uses of Plaster of Paris.

5

**OR**

- (b) An acid 'X' present in tamarind when mixed with 'Y', produces a mixture 'Z'. 'Z' on addition to a dough when heated makes cakes soft and spongy. 'Y' is prepared from common salt and helps in faster cooking.
- (i) Write the common names of 'X', 'Y' and 'Z', and the chemical formula of 'Y'.
  - (ii) How is 'Y' prepared and how does it help in making cakes soft and spongy ? Illustrate the reaction with suitable chemical equation.
  - (iii) Write the name and chemical formula of a mild base other than 'Y' used as an antacid.

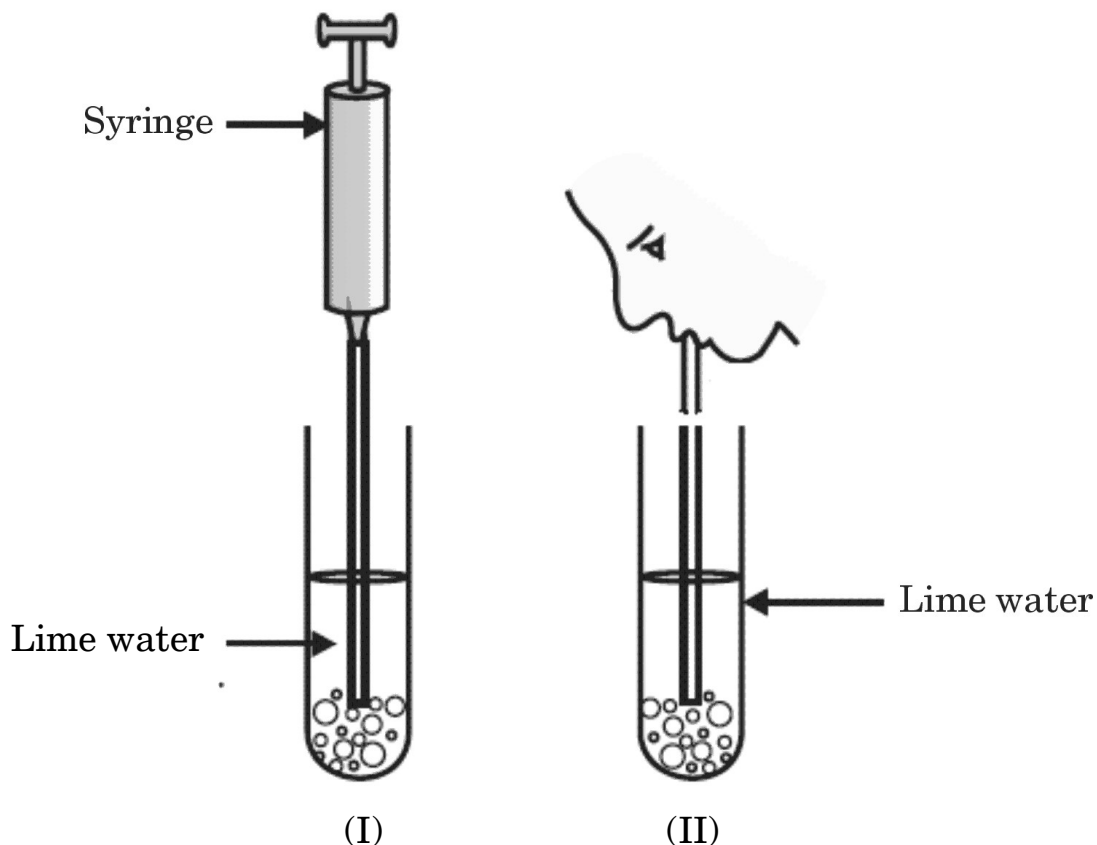
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35. (a) Design an experiment to demonstrate that carbon dioxide is essential for photosynthesis. Write the observation and conclusion of the experiment.

5

OR

- (b) (i)



In the experimental set-up shown above in diagram (I) atmospheric air is being passed into lime water with a syringe while in diagram (II) air is being exhaled into lime water. The time taken for the lime water to turn milky in both the test tubes is different. Give reason.

- (ii) Draw the diagram of an open stomatal pore and label (I) Guard cells, and (II) Chloroplast on it. Mention two functions performed by stomata.

5

- 36.** (a) (i) The potential difference across the two ends of a circuit component is decreased to one-third of its initial value, while its resistance remains constant. What change will be observed in the current flowing through it ? Name and state the law which helps us to answer this question.
- (ii) Draw a schematic diagram of a circuit consisting of a battery of four 1.5 V cells, a 5  $\Omega$  resistor, a 10  $\Omega$  resistor and a 15  $\Omega$  resistor and a plug key, all connected in series. Now find (I) the electric current passing through the circuit, and (II) potential difference across the 10  $\Omega$  resistor when the plug key is closed.

5

**OR**

- (b) (i) When is the potential difference between two points said to be 1 volt ?
- (ii) A copper wire has a diameter of 0.2 mm and resistivity of  $1.6 \times 10^{-8} \Omega \text{ m}$ . What will be the length of this wire to make its resistance 14  $\Omega$  ? How much does the resistance change, if the diameter of the wire is doubled ?

5

### SECTION E

*Questions no. 37 to 39 are case-based/data-based questions with 3 short sub-parts. Internal choice is provided in one of these sub-parts.*

- 37.** Carbon is a versatile element that forms the basis of all living organisms and many of the things we use. A large variety of compounds is formed because of its tetravalency. Compounds of carbon are formed with oxygen, hydrogen, nitrogen, sulphur, chlorine and many other elements.

Answer the following questions :

- (a) What are hydrocarbons ?

1

(b) List two properties by virtue of which carbon can form a large number of compounds. 1

(c) (i) Write the formula of the functional group present in (1) aldehydes, and (2) ketones. Write chemical equation for the reaction that occurs between ethanoic acid and ethanol in the presence of a catalyst. 2

**OR**

(c) (ii) What are structural isomers ? Write the structures of two isomers of butane ( $C_4H_{10}$ ). 2

**38.** Pollination is an important process in sexual reproduction of plants. It is an essential process that facilitates fertilisation in plants. Pollinating agents can be wind, water, insects and birds. Several changes take place in the flower after the fertilization has taken place.

(a) Write the main difference between self-pollination and cross-pollination. 1

(b) Name the part of the flower which attracts insects for pollination. What happens to this part after fertilisation ? 1

(c) (i) Define fertilisation. What is the fate of ovules and the ovary in a flower after fertilisation ? 2

**OR**

(c) (ii) In a germinating seed, which parts are known as future shoot and future root ? Mention the function of cotyledon. 2

- 39.** A highly polished surface such as a mirror reflects most of the light falling on it. In our daily life we use two types of mirrors — plane and spherical. The reflecting surface of a spherical mirrors may be curved inwards or outwards. In concave mirrors, reflection takes place from the inner surface, while in convex mirrors reflection takes place from the outer surface.
- (a) Define the principal axis of a concave mirror. 1
- (b) A ray of light is incident on a concave mirror, parallel to its principal axis. If this ray after reflection from the mirror passes through the principal axis from a point at a distance of 10 cm from the pole of the mirror, find the radius of curvature of the mirror. 1
- (c) (i) An object is placed at a distance of 10 cm from the pole of a convex mirror of focal length 15 cm. Find the position of the image. 2

**OR**

- (c) (ii) A mirror forms a virtual, erect and diminished image of an object. Identify the type of this mirror. Draw a ray diagram to show the image formation in this case. 2