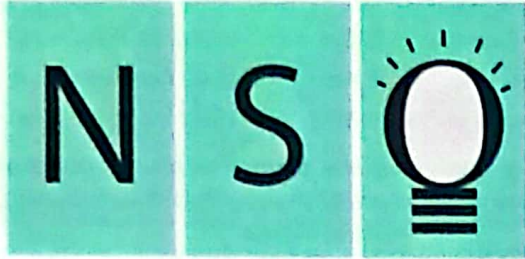




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**SOF NATIONAL SCIENCE
OLYMPIAD 2024-25**

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CLASS **10**

SET-B

Total Questions : 50 | Time : 1 hr.

Guidelines for the Candidate

1. You will get additional ten minutes to fill up information about yourself on the OMR Sheet, before the start of the exam.
2. Write your **Name, School Code, Class, Section, Roll No.** and **Mobile Number** clearly on the **OMR Sheet** and do not forget to sign it. We will share your marks / result and other information related to SOF exams on your mobile number.
3. The Question Paper comprises three sections:
Logical Reasoning (10 Questions), **Science** (35 Questions) and **Achievers Section** (5 Questions)
Each question in Achievers Section carries 3 marks, whereas all other questions carry one mark each.
4. All questions are compulsory. There is no negative marking. Use of calculator is not permitted.
5. There is only ONE correct answer. Choose only ONE option for an answer.
6. To mark your choice of answers by darkening the circles on the OMR Sheet, use **HB Pencil** or **Blue / Black ball point pen** only. E.g.
Q.16: If a mixture can be separated by magnetic separation, one of the constituents must be
A. Ferrous B. Non-ferrous C. Precious D. Non-metallic.
As the correct answer is option A, you must darken the circle corresponding to option A on the OMR Sheet.
7. Rough work should be done in the blank space provided in the booklet.
8. Return the OMR Sheet to the invigilator at the end of the exam.
9. Please fill in your personal details in the space provided before attempting the paper.
10. **Participate in SOF-Techfest IIT Bombay Innovation Challenge. Open for class 8, 9 & 10. For details and to participate, please turn to last page.**

16. ☒ A ☐ B ☐ C ☐ D

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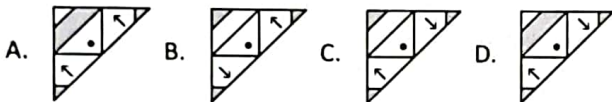
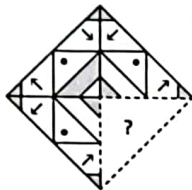
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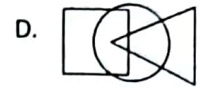
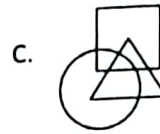
8
Olympiads

LOGICAL REASONING

- Select the odd one out.
A. QFVK B. NQSV C. TLYP D. MBRG
- Find the number of parallelograms formed in the given figure.
A. 15
B. 16
C. 17
D. More than 17
- If the first and the last digits of each of the given numbers are interchanged and then two is added to the middle and last digits of each number from the left end, then which of the following is the second lowest number thus formed?
423 512 417 316 427
A. 346 B. 237 C. 635 D. 736
- Select the correct order of signs from the options given below, so that the given equation becomes correct.
 $77 \square 37 \square 45 \square 5 \square 12 = 6$
A. $+, \div, -, \times$ B. $+, -, \div, \times$
C. $+, \times, \div, -$ D. Both B and C
- Select a figure from the options, which when placed in the blank space of the given figure would complete the pattern.



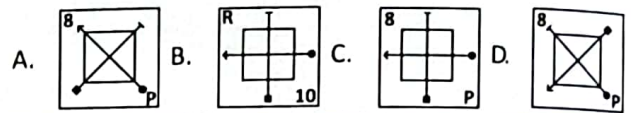
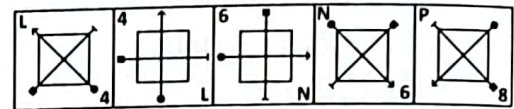
- Which of the following options does not satisfy the same conditions of placement of dots as in the given figure?



- Aaliya is 50 m North of Sahil. Sahil moves 40 m towards West and Aaliya moves 20 m towards South. Aaliya then turns right and moves 50 m while Sahil moves 70 m after turning to his right. How far and in which direction is Aaliya with respect to Sahil now?
A. $10\sqrt{17}$ m, North-West B. $10\sqrt{17}$ m, North-East
C. $10\sqrt{17}$ m, South-West D. $10\sqrt{7}$ m, South-West

- Select a figure from the options which will continue the same series as established by the Problem Figures.

Problem Figures



- Arrange the following words in the order in which they occur in a dictionary and select the correct option.

- Participate 2. Partnership 3. Partition
- Participle 5. Particular

- 1, 4, 5, 2, 3
- 4, 1, 5, 3, 2
- 1, 4, 5, 3, 2
- 4, 1, 5, 2, 3

- A number arrangement machine when given an input line of numbers rearranges them following a particular rule in each step. The following is an illustration of input and steps of rearrangement.

Input : 59 83 52 47 68 21 54

Step I : 83 59 52 47 68 21 54

Step II : 83 21 59 52 47 68 54

Step III : 83 21 68 59 52 47 54

Step IV : 83 21 68 47 59 52 54

Step IV is the last step of the given input.

As per the rule followed in the above steps, which of the following will be the last step for the given input?

Input : 93 82 11 51 97 83 17

- 11 97 17 93 51 83 82
- 97 11 93 17 83 51 82
- 97 11 93 17 83 82 51
- 11 93 17 83 51 82 97

SCIENCE

- The refractive index of the material of a prism is $\sqrt{2}$ and the angle of the prism is 30° . One of the two refracting surfaces of the prism is made a mirror inwards, by silver coating. A beam of monochromatic light entering the prism from the other face will retrace its path (after reflection from the silvered surface) if the angle of incidence on the prism is

- 60°
- 45°
- zero
- 30°

- Meena buys a 1500 W electric iron of resistance about 32.2Ω and a 100 W electric bulb of resistance about 484Ω . She connects both of them one by one with a supply of 220V. Match column I with column II and select the correct option from the given codes.

Column I

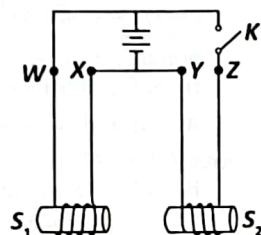
Column II

- | | |
|---|--------------------|
| (a) Heat generated in 6 seconds across electric iron | (i) 2.8 kJ |
| (b) Heat generated in 9 seconds across electric bulb | (ii) 9 kJ |
| (c) Appliance(s) used in an electric board having 10 A rating | (iii) 0.9 kJ |
| (d) Appliance(s) used in electric board having 5A rating | (iv) Electric Iron |
| | (v) Electric Bulb |
- A. (a)-(ii); (b)-(iii); (c)-(iv); (d)-(iv), (v)
 B. (a)-(i); (b)-(ii); (c)-(iv), (v); (d)-(iv)
 C. (a)-(ii); (b)-(iii); (c)-(iv), (v); (d)-(v)
 D. (a)-(ii); (b)-(i); (c)-(v); (d)-(iv), (v)

13. A wooden block is floating in a water container. This block is pressed to the bottom of the container. The work done in the process is equal to

- A. The loss in gravitational potential energy of the block
 B. Work done against upthrust, plus loss of gravitational potential energy of the block
 C. Work done against upthrust exerted by the water
 D. Work done against upthrust, minus loss of gravitational potential energy of the block.

14. The given figure shows two solenoids S_1 and S_2 , hanging through conducting wires from contact points W and X, and contact points Y and Z respectively, so that each can swing left and right. After the key K is closed



- A. S_1 and S_2 move towards each other
 B. Both S_1 and S_2 move towards right
 C. S_1 and S_2 move away from each other
 D. Both S_1 and S_2 remain in their original positions.
15. The regular bus service is available between the two cities P and Q for every t minutes. Riyansh starts to walk from P to Q with a speed of 8 km/h. In every 20 minutes, a bus crosses Riyansh in his own direction of motion and in every 10 minutes another bus crosses in opposite direction. If all the buses moves with the same velocity, what is the speed with which buses are moving?
- A. 20 km/h B. 24 km/h C. 16 km/h D. 8 km/h

16. In an optical experiment, with the position of the object fixed, a student varies the position of a convex lens. A graph between the object distance u and the image distance v , from the lens, is plotted using the same scale for the two axes. A straight line passing through the origin and making an angle of 45° with the x-axis meets the experimental curve at P. The coordinates of P will be

- A. $(2f, 2f)$ B. $(\frac{f}{2}, \frac{f}{2})$ C. (f, f) D. $(4f, 4f)$

17. Read the given statements and select the correct option which identifies them as true(T) and false(F) ones.

- (i) Force acting on a particle for equal time intervals can produce the same change in momentum.
 (ii) Force acting on a particle for equal displacement can produce same change in kinetic energy.
 (iii) Force acting on a particle for equal time intervals produces different changes in kinetic energy.
 (iv) Force acting on a particle for equal displacement can produce same change in momentum.

- | | (i) | (ii) | (iii) | (iv) |
|----|-----|------|-------|------|
| A. | F | T | T | F |
| B. | F | F | F | T |
| C. | T | T | F | F |
| D. | T | T | T | F |

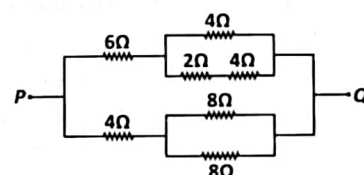
18. Read the given statements and select the correct option.

Statement 1 : For a sound wave oscillating up and down five times, in time equivalent to the time taken by a person to move 10 m at a speed of 2m/s, the frequency will be equal to 5 Hz.

Statement 2 : For this wave, if distance between two crests is 340 m, the velocity of sound wave will be 340 m/s.

- A. Both statements 1 and 2 are true.
 B. Both statements 1 and 2 are false.
 C. Statement 1 is true but statement 2 is false.
 D. Statement 1 is false but statement 2 is true.

19. What will be the ratio of currents passing through 2Ω resistance to 8Ω resistance in an electric network shown in the given figure when the potential between P and Q is 12 V?

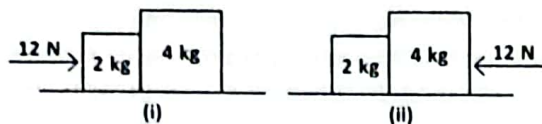


- A. 4 : 7 B. 3 : 4 C. 10 : 7 D. 16 : 21

20. In which of the following conditions, the angle of deviation by prism will always be minimum?

- (i) Angle of incidence is equal to the angle of emergence.
 (ii) Incident ray and emergent ray are symmetric to the prism.
 (iii) The refractive index of the material of the prism is less than that of medium of incidence.
 (iv) The angle of prism is 30° .
- A. (i) and (iv) only B. (i) and (ii) only
 C. (ii) and (iii) only D. (iii) and (iv) only

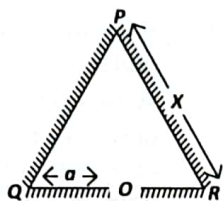
21. Two blocks of masses 2 kg and 4 kg are placed together on a smooth horizontal surface. A horizontal force of 12 N is applied on 2 kg block in case (i) and on 4 kg block in case (ii), as shown in the given figures.



Which of the following statement(s) is/are correct about both the cases?

- (i) The force of interaction on 4 kg block is equal in both the cases.
 (ii) The acceleration of the blocks will be greater in case (i) compared to case (ii).
 (iii) The value of force of interaction on the 4 kg block in case (i) will be 8 N.
- A. (iii) only B. (i) only
 C. (ii) only D. (i) and (ii) only

22. An equilateral triangle PQR of side X is made of three plane mirrors. There is a small hole (O) at distance $a = X/2$ from one of the corners of the triangle as shown in the given figure. The cross-section of mirror arrangement and the ray of light lie on the same plane. A ray of light is passed through the hole at an angle i which can only come out through the same hole.



For what value angle of incidence the ray will come out via the hole (O) after two reflections?

- A. 30° B. 45° C. 90° D. 60°

23. A compound P ($C_2H_4O_2$) reacts with Na metal to form a compound Q and evolves a gas that burns with a pop sound. Compound P , when treated with an alcohol R in the presence of an acid, forms a sweet-smelling compound S ($C_4H_8O_2$). When NaOH is added to S then, Q and R are again formed. P , Q , R and S are respectively

- A. CH_3COOH , C_2H_5ONa , C_2H_5OH , CH_3COOCH_3
 B. CH_3COOH , C_2H_5ONa , CH_3OH , $CH_3COOC_2H_5$
 C. CH_3COOH , CH_3COONa , C_2H_5OH , $CH_3COOC_2H_5$
 D. CH_3COOH , CH_3COONa , CH_3OH , $CH_3COOC_2H_5$

24. If the formula of chloride of a metal M is MCl_2 , then the atomicity of the phosphate of metal M and the atomicity of bicarbonate of metal M will be respectively

- A. 17, 13 B. 17, 6 C. 13, 11 D. 11, 13

25. Read the following statements and select the option that correctly identifies them as true (T) and false (F) ones.

- (i) During respiration, the air we breathe reduces glucose in the cells of our body that gives required amount of energy to our body. Thus, respiration is an endothermic process.
 (ii) During thermal decomposition of ferrous sulphate crystals a yellow coloured oxide, FeO is formed along with the evolution of SO_2 and SO_3 gases.

- (iii) The decomposition of $KClO_3$ is endothermic while slaking of lime is an exothermic reaction.

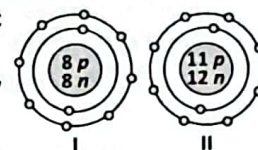
- (iv) When lead nitrate is heated in a test tube, a yellow residue of PbO_2 is obtained.

	(i)	(ii)	(iii)	(iv)
A.	T	T	T	F
B.	F	F	T	F
C.	T	T	F	F
D.	F	T	F	T

26. Select the incorrect match.

Reaction	Reducing agent
A. $ZnO + C \longrightarrow Zn + CO$	C
B. $2Mg + O_2 \longrightarrow 2MgO$	O_2
C. $Fe_2O_3 + 3CO \longrightarrow 2Fe + 3CO_2$	CO
D. $2H_2 + O_2 \longrightarrow 2H_2O$	H_2

27. Observe the given schematic atomic structures carefully: Particles I and II are respectively



- A. Ne, O B. N^{3-} , K^+
 C. O^{2-} , Na^+ D. F^- , Mg^{2+}

28. A few substances are listed in the box:

(i) Soil	(ii) Silver	(iii) Ethane
(iv) Magnesium	(v) Coal	(vi) Blood
(vii) Sodium carbonate		

Select the correct statement about these substances from the following.

- A. (i) and (vi) are compounds while (iii) and (iv) are mixtures.
 B. (ii) and (iv) are elements while (iii) and (vii) are compounds.
 C. (v), (vi) and (vii) are compounds while (i) and (iii) are mixtures.
 D. (vii) is a compound while (iii) and (iv) are elements.

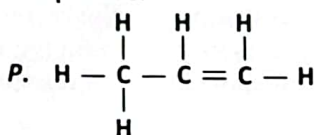
29. Read the given statements and select the correct option.

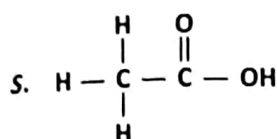
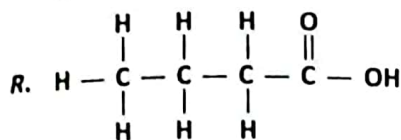
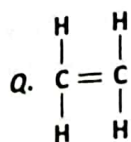
Statement 1 : Metal sulphides and carbonates are converted to metal oxides before the process of reduction.

Statement 2 : The reduction of metal oxides is easier than the reduction of metal sulphides and carbonates.

- A. Both statements 1 and 2 are true and statement 2 is the correct explanation of statement 1.
 B. Both statements 1 and 2 are true but statement 2 is not the correct explanation of statement 1.
 C. Statement 1 is true and statement 2 is false.
 D. Both statements 1 and 2 are false.

30. Consider the structures of the following organic compounds:





Based on the structures of these organic compounds, select the correct statement(s) from the following.

- P is a homologue of Q and decolourises bromine water.
- The reaction of S with sodium carbonate results in the evolution of hydrogen gas.
- The chemical properties of R and S are not same but their physical properties are same.
- Q is formed when ethanol undergoes dehydration reaction in the presence of conc. H_2SO_4 at 443 K.

- A. (iv) only B. (i) and (ii) only
C. (ii) and (iii) only D. (i) and (iv) only

31. Given figure shows the effects of temperature and pressure on the three states of matter.



Select the option that correctly identifies the conditions w , x , y and z .

- | x, y | w, z |
|--|---|
| A. Increase in temperature, Decrease in pressure | Decrease in temperature, Increase in pressure |
| B. Decrease in temperature, Decrease in pressure | Decrease in temperature, Decrease in pressure |
| C. Decrease in temperature, Increase in pressure | Increase in temperature, Decrease in pressure |
| D. Increase in temperature, Decrease in pressure | Increase in temperature, Decrease in pressure |

32. P is a hydrated sulphate salt of calcium. When P is heated to 373 K, Q molecules of water are lost, resulting in the formation of R , which is used in hospitals for setting fractured bones. R on heating at 200 °C gives S which is known as T .

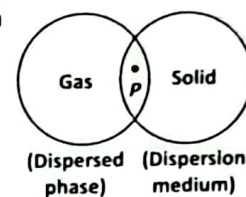
Identify P , Q , R , S and T .

- A. $P \rightarrow \text{CaSO}_4 \cdot 2\text{H}_2\text{O}$, $Q \rightarrow \frac{3}{2}$, $R \rightarrow \text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$,
 $S \rightarrow \text{CaSO}_4$, $T \rightarrow$ Calcium sulphate hemihydrate
- B. $P \rightarrow 2\text{CaSO}_4 \cdot \text{H}_2\text{O}$, $Q \rightarrow \frac{1}{2}$, $R \rightarrow 2\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$,
 $S \rightarrow \text{CaSO}_3$, $T \rightarrow$ Dead burnt plaster
- C. $P \rightarrow \text{CaSO}_4 \cdot 2\text{H}_2\text{O}$, $Q \rightarrow 3$, $R \rightarrow \text{CaSO}_4 \cdot \text{H}_2\text{O}$,
 $S \rightarrow \text{CaSO}_4$, $T \rightarrow$ Calcium sulphate hemihydrate

- D. $P \rightarrow \text{CaSO}_4 \cdot 2\text{H}_2\text{O}$, $Q \rightarrow \frac{3}{2}$, $R \rightarrow \text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$,
 $S \rightarrow \text{CaSO}_4$, $T \rightarrow$ Dead burnt plaster

33. Study the given Venn diagram carefully and identify P .

- A. Fog
B. Jelly
C. Mist
D. Sponge



34. Aqueous solutions of salts are either acidic, basic or neutral. A few common salts are listed as

- Sodium acetate
- Aluminium chloride
- Potassium nitrate
- Sodium hydrogen carbonate

Which of the following statements is correct regarding these salts?

- A. II is an acidic salt while I is a basic salt.
B. III is a basic salt while IV is an acidic salt.
C. II is a neutral salt while III is an acidic salt.
D. I is a basic salt while IV is a neutral salt.

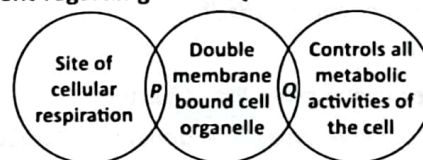
35. Which of the following is not a function of ethylene hormone in plants?

- A. It is highly effective in ripening of climacteric fruits.
B. It promotes yellowing and senescence of leaves.
C. It stimulates the formation of abscission zone in leaves, flowers and fruits.
D. It promotes bolting in rosette plants.

36. Which of the following correctly shows what changes can be observed in the concentrations of estrogen and progesterone in the blood and the thickness of the uterine lining from the day of ovulation till 3-4 days in a normal human female having menstrual cycle of 28 days?

Estrogen concentration	Progesterone concentration	Thickness of uterine lining
A. Decreases	Increases	Increases
B. Decreases	Increases	Decreases
C. Increases	Decreases	Increases
D. Increases	Increases	Decreases

37. Refer to the given Venn diagram and select the correct statement regarding P and Q .



- A. Organelle P traps the solar energy and synthesises food by the process of photosynthesis.
B. Organelle Q provides mechanical support by forming the skeletal framework of the cell.
C. Organelle P provides intermediates for the synthesis of various biochemicals like chlorophyll and steroids.
D. Organelle Q helps in spindle formation during cell division.

38. Select the incorrect match.

Mendelian characteristic	Dominant trait
A. Pod colour	– Green
B. Seed colour	– Yellow
C. Pod shape	– Inflated
D. Floral position	– Terminal

39. In which of the following food chains, top consumer will get the maximum energy from the producer?

- Green plant → Small bird → Snake
- Green plant → Caterpillar → Small bird → Snake
- Grass → Grasshopper → Frog → Snake → Eagle
- Oak tree → Bird → Lice → Bacteria

40. Refer to the given table of differences and select the option that identifies the incorrect pair of differences.

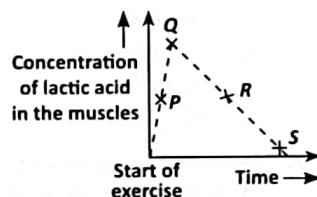
	Xylem	Phloem
(i)	It conducts water and inorganic solutes in vascular plants.	It conducts organic solutes in vascular plants.
(ii)	Its components include tracheids, vessels, xylem parenchyma and xylem fibres.	Its components include sieve tubes, companion cells, phloem parenchyma and phloem fibres.
(iii)	Conducting channels are tracheids and vessels.	Conducting channels are sieve tubes.
(iv)	Conduction occurs in both upward or downward directions.	Conduction mostly occurs in upward direction.
(v)	Tracheids and xylem parenchyma are dead while vessels and xylem fibres are living.	Sieve tubes, companion cells and phloem fibres are dead and only phloem parenchyma is living.

- (i) and (iii) only
- (iv) and (v) only
- (iii) and (iv) only
- (ii) and (v) only

41. The given graph shows the changes in lactic acid concentration in the muscles of a runner during and after a 200 metres race.

At which point did the runner finish the race?

- P
- Q
- R
- S



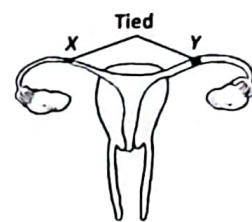
42. Refer to the given list of bacteria.

Rhizobium, *Pseudomonas*, *Nitrobacter*,
Nitrococcus, *Thiobacillus denitrificans*

How many of the given bacteria are denitrifying?

- 2
- 5
- 4
- 1

43. The given diagram shows the female reproductive system after the fallopian tubes are tied at positions X and Y during a surgery.



Which of the following statements is/are correct regarding the given diagram?

- Fertilisation cannot take place naturally in this reproductive system.
- The female will not be able to release any reproductive cells.
- The male reproductive cells cannot travel beyond positions X and Y and fertilisation of the released egg is prevented.

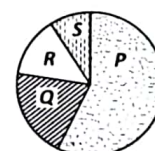
- (i) only
- (ii) only
- (iii) only
- (i) and (iii) only

44. Read the following statements and select the option which correctly identifies them as true (T) and false (F) ones.

- Broccoli, cabbage and cauliflower have been obtained through artificial selection from wild cabbage.
- Manures add organic matter to the soil which improves the texture of soil and increases the water retention capacity of soil.
- Rust of wheat is a soil borne disease.
- Karan Fries is a cross-breed of Holstein-Friesian and Sahiwal.

- | | | | | |
|----|-----|------|-------|------|
| | (i) | (ii) | (iii) | (iv) |
| A. | T | T | F | T |
| B. | T | T | F | F |
| C. | T | F | T | F |
| D. | F | T | T | T |

45. Refer to the given pie chart regarding contribution of different greenhouse gases (P-S) to global warming and select the incorrect statement regarding them.



- Q is also produced by incomplete decomposition mostly by anaerobic methanogens.
- R are synthetic gaseous compounds of carbon and halogen.
- S is used in aerosol cans, jet fuel, air conditioners and refrigerators.
- Excessive use of fossil fuel is adding more P to atmosphere.

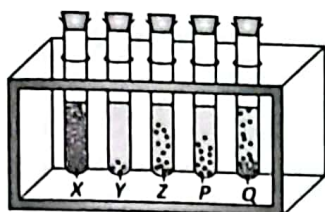
ACHIEVERS SECTION

Directions (Q. No. 46 and 47): Refer to the given paragraph and answer the questions.

On the basis of reactions of metals with oxygen, water, acid,

etc., it is found that some metals are highly reactive, some are less reactive while some are almost unreactive. Hence, metals can be arranged on the basis of their relative reactivity.

The following set up was prepared to study the reactions of different metals with dilute HCl. Small pieces of five metals X, Y, Z, P and Q were taken in five separate test tubes each containing 10 mL of dilute HCl. The rate of evolution of hydrogen gas in the form of bubbles was observed.



46. On the basis of the above experiment the conclusions that can be made are

- Metal X is least reactive while metal Q is most reactive.
- Metal Z is more reactive than metal P but less reactive than metal Q.
- Metal P is more reactive than metal Y but less reactive than metal Q.
- Metal Q is less reactive than metal X but more reactive than metal Y.

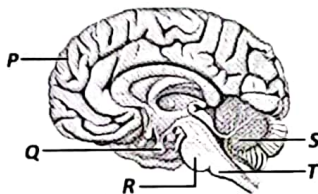
- A. (iii) and (iv) only B. (i) and (ii) only
C. (i) and (iii) only D. (ii), (iii) and (iv) only

47. Which of the following statements about the given metals is/are not correct?

- Metal Q can be found in free state in nature.
- Metal X can be extracted by reducing its oxide with carbon.
- Metal Y can be obtained by electrolysis of its molten chloride.

- A. (i) only B. (ii) and (iii) only
C. (i) and (iii) only D. (i), (ii) and (iii)

48. Refer to the given figure of the human brain. Identify the labelled parts P, Q, R, S and T and select the correct statements regarding them.



- P contains upward folds and downward grooves called gyri and sulci respectively.
- Q secretes hormone that stimulates thyroid gland to secrete thyroxine.
- R forms a bridge of nerve tracts from the cerebrum to the cerebellum.
- T makes the body movements smooth, steady and coordinated.
- S contains centres for swallowing, sneezing, coughing and vomiting.

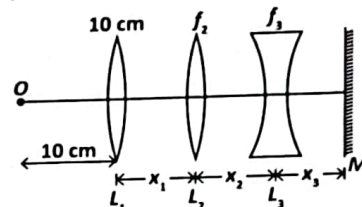
- A. (i), (ii) and (v) only B. (i), (ii) and (iii) only
C. (iii), (iv) and (v) only D. (ii) and (iv) only

49. Read the given statements and select the option that correctly fills any three of the given blanks.

- _____ shows transverse binary fission.
- In flowering plants, the ovule bears an opening at its base called _____.
- In human females, at birth each ovary usually contains about _____ million immature ova.
- At puberty, the commencement of menstruation is termed as _____.
- Sterilisation method of birth control in females is known as _____.
- Syphilis is a sexually transmitted disease caused by _____.

- A. (i) - *Paramecium*, (iv) - Menarche, (v) - Tubectomy
B. (ii) - Hypostome, (iv) - Menopause, (vi) - *Trichomonas vaginalis*
C. (i) - *Euglena*, (iii) - 1-2, (vi) - *Treponema pallidum*
D. (ii) - Micropyle, (iii) - 3-4, (v) - Vasectomy

50. Three lenses L_1 , L_2 and L_3 are placed as shown in the given figure. There is a plane mirror M placed in front of L_3 . The combination forms the image of the point object O , at the object itself.



Focal lengths of the lenses are written with the lenses.

Now, match column I with column II and select the correct option from the given codes.

Column I

Column II

- (p) $x_1 = 10$ cm, $x_2 = 15$ cm, $x_3 = 20$ cm (i) $f_2 = 20$ cm
(q) $x_1 = 20$ cm, $x_2 = 20$ cm, $x_3 = 10$ cm (ii) $f_2 = 25$ cm
(r) $x_1 = 40$ cm, $x_2 = 20$ cm, $x_3 = 15$ cm (iii) $f_2 = 30$ cm
(s) $x_1 = 35$ cm, $x_2 = 25$ cm, $x_3 = 30$ cm (iv) $f_2 = 35$ cm

- A. (p) - (ii); (q) - (i), (iii); (r) - (ii), (iv); (s) - (iv)
B. (p) - (i), (ii); (q) - (ii), (iv); (r) - (i), (iii); (s) - (iii)
C. (p) - (i); (q) - (ii); (r) - (iii); (s) - (iii)
D. (p) - (i); (q) - (ii), (iii); (r) - (ii), (iii); (s) - (iv)

SPACE FOR ROUGH WORK



Techfest
IIT Bombay

PRESENTS

**INNOVATION
CHALLENGE**

FOR CLASSES 8, 9 & 10

SOF-TECHFEST IIT BOMBAY INNOVATION CHALLENGE

Introduction

Techfest is Asia's Largest Science and Technology Festival and the Annual Science and Technology Festival of IIT Bombay. With the sole motto of nurturing young talent and promoting innovative thinking among school students, Techfest is conducting an Innovation Challenge in association with the Science Olympiad Foundation for school students across India. It is a platform for young visionaries and problem solvers to showcase their creativity, ingenuity, and technical prowess.

Guidelines:

- Appearing in the Innovation Challenge is not compulsory. In case you wish, please visit www.techfest.org/innovationchallenge. No registration fee is to be paid.
- To participate, read the following problem statement and email the answer at ic.iitbombay@sofworld.org.
- Answers should be submitted as per the following schedule:

NSO Set-A 18 th October	NSO Set-B 12 th November	NSO Set-C 3 rd December
By 27 th October	By 22 nd November	By 8 th December

PROBLEM STATEMENT

Green Innovation: Technological Breakthroughs for a Sustainable Tomorrow

As the world faces increasing environmental and societal challenges, the combination of sustainability and Artificial Intelligence (AI) offers powerful solutions. Below are three distinct ways we can approach these challenges. Select one to explore how technology can help create a more sustainable world:

- **Sustainable Plastic Waste Management** - How can we develop innovative and eco-friendly ways to manage plastic waste without reducing the use of plastic in our daily lives?
- **AI's Role in the Modern World** - Why is AI essential in today's world? How can AI help prevent crimes, enhance security, and make a positive impact on society?
- **AI and Sustainability: Building a Greener Future** - How can AI and sustainability be combined to create innovative solutions that reduce environmental harm and promote long-term eco-friendly practices?

Choose ANY ONE of the above topics and answer in the following format :

Title - Write the title of the chosen topic.

Problems - Identify the environmental, social, or industrial challenges related to your chosen topic and explain the need for sustainable or AI-powered solutions (100-150 words).

Solutions - Propose innovative ideas to address these challenges, using either sustainability, AI, or a combination of both (150-200 words).

Conclusion - Justify your solutions concerning their implementation and impact (in about 50-100 words).

Rewards:

- Each participant will be awarded a Certificate of Participation from SOF-Techfest, IIT Bombay.
- Top 20 students will be invited to Techfest 2024-25 with an accompanying adult from 17th to 19th December, 2024 with travel and accommodation provided by Techfest, IIT Bombay.
- Winners will be awarded trophies, gifts, certificates, and a visit to IIT Bombay's new Research Park, also they may get a visit to ISRO's Vikram Sarabhai Space Centre, Thiruvananthapuram.

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