S I M S®

(SCHOLARS INTEGRAL MATHS & SCIENCE OLYMPIADS)

CLASS X

BIGGEST NATIONAL LEVEL OLYMPIADS (STAGE - II)

MAX. MARKS : 100 **SISO QUESTION PAPER** **TIME: 60 MIN.**

NAME OF THE STUDENT : .....

HALL TICKET NUMBER : .....

NAME OF THE SCHOOL : .....

INSTRUCTIONS TO THE STUDENTS :

- Write your Hall ticket number immediately after receiving the question paper booklet.
- Darken the answers only on the OMR Sheet.
- Read the instructions given on the OMR sheet and follow them accordingly.
- Don't write any thing on the question paper booklet.
- To do rough work, use only the white paper provided in the examination hall.
- **No negative marks.**
- This question paper booklet consists of 45 questions.
- **PHYSICS** (Q.No-1 to 15) :
  First 10 questions (1 to 10) are single correct answer type.
  Each question carries TWO marks.
  Next 5 questions (11 to 15) are one or more than one correct answer type.
  Each question carries THREE marks.
- **CHEMISTRY** (Q.No-16 to 30) :
  First 10 questions (16 to 25) are single correct answer type.
  Each question carries TWO marks.
  Next 5 questions (26 to 30) are one or more than one correct answer type.
  Each question carries THREE marks.
- **BIOLOGY** (Q.No-31 to 45) :
  All questions (31 to 45) are single correct answer type.
  Each question carries TWO marks.
- Students are not allowed to use any Mathematical and Physical tables (OR) any other electronic devices.
- After completion of the examination hand over the OMR answer sheet to the invigilator without fail. You can retain the question paper with you.
- Students should not leave the examination hall before the last bell rings.
- To know your results log in to our website **www.simsolympiads.org** after 1st March-2017.
- Stage-I result copy will be sent to the school mail id. Please contact your branch principal to know your branch result.

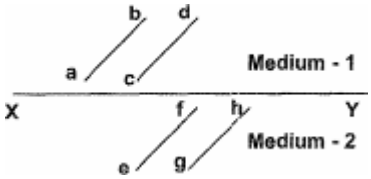
CLASS : X PHYSICS

Single Correct Answer Type: **10 × 2 = 20M**

1. Read the passage carefully and answer

The figure shows a surface XY separating two trarsparent media, medium-1 and medium-2

The lines ab and cd represent wavefronts of a light wave traveling in medium-1 on incident on XY. The lines ef and gh represent wavefronts of the light wave travelling in medium-2 after refraction. We conclude that



Speed of light is

1) The same in medium -1 and medium - 2
2) Larger in medium-1 than in medium - 2
3) Larger in medium-2 than in medium -1
4) Different at b and d

2. Read the given statements and mark the correct option

Statement 1 : For observing traffic at our back, we prefer to use a concave mirror

Statement 2 : A concave mirror has a much larger field of view than a plane mirror or a convex mirror

1) Both statements 1 and 2 are true and statement 2 is the correct explanation of statement 1
2) Both statements 1 and 2 are true but statement 2 is not the correct explanation of statement 1
3) Statement 1 is true but statement 2 is false
4) Both statements 1 and 2 are false

3. In a 'three pin plug', why is the earth pin made longer and thicker than other pins?

1) For proper electrical position
2) For greater efficiency
3) To reduce heat losses
4) For good look

4. Match column I with column II and select the correct option from the codes given below.

Column I	Column II
(a) Choroid	(i) Detects light stimulus
(b) Retina	(ii) Absorbs light and prevent it from being reflected within the eyeball
(c) Cornea	(iii) Controls the size of the pupil
(d) Iris	(iv) Helps to focus light as it enters the eye

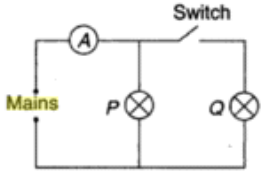
1) A B C D
(ii) (i) (iv) (iii)

2) A B C D
(i) (ii) (iii) (iv)

3) A B C D
(ii) (iii) (ii) (i)

4) A B C D
(iii) (iv) (i) (iii)

5. How will be the reading in the ammeter A affected if another identical bulb Q is connected in parallel to 'P ? The voltage in the mains is maintained at a constant value



1) The reading will be reduced to one-half
2) The reading will not be effected
3) The reading will be double the previous value
4) The reading will be increased four-fold

6. Match column I with column II and select the correct option from the codes given below

Column I	Column II
(a) Fleming's left hand rule	(i) Application of electromagnetic induction
(b) Fleming's right hand rule	(ii) Direction of magnetic force on carrying conductor in uniform a current magnetic field
(C) Solenoid	(iii) Similar to bar magnet
(d) Electric generator	(iv) Direction of induced current

1) A B C D
(ii) (iii) (iv) (ii)

2) A B C D
(ii) (iv) (iii) (i)

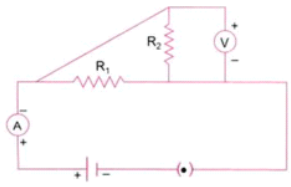
3) A B C D
(iv) (iii) (i) (ii)

4) A B C D
(iii) (i) (ii) (iv)

7. A current carrying conductor placed in magnetic field experiences a force. The displacement of the conductor in magnetic field can be increased by

1) Decreasing the magnetic field
2) Decreasing the current in the conductor
3) Increasing the magnetic field
4) None of the above

8. Which two circuit components are connected in parallel in the following circuit diagram?

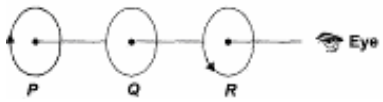


1) R_1 & R_2 only
2) R_1,R_2 & V
3) R_2 & V only
4) R_1 & V only

9. Potential difference between a live wire and a neutral wire is

1) 200 volt 2) 150 volt 3) 210 volt 4) 220 volt

10. Three closed similar coils P, Q and R are placed such that their planes are parallel. In the coil P, and R, current of same magnitude flows as shown in the figure. Coils Q and R are static while coil P is moved with a uniform speed towards Q, then



1) Clockwise current will be induced in coil Q as seen by eye
2) Anti-clockwise current will be induced in coil Q, as see by eye
3) No current will flow in coil P
4) Current induced in coil Q will be equal to P and R, but in opposite direction, hence net current in Q will be zero

Multi Correct Answer Type : **5 × 3 = 15M**

11. Choose the correct statements from the following

1) A low voltage supply of, say, 6V must have a very low internal resistance
2) A high voltage supply of, say, 6000V must have a very high internal resistance
3) A wire carrying current stays electrically neutral
4) A high resistance voltmeter is used to measure the emf of a cell.

12. A person looks into the mirror by placing it close to his face. The image of his face was erect, laterally inverted and of the same size. Then, Which of the following mirror does not satisfy the conditions ?

1) Plane 2) Concave 3) Convex 4) Plane or concave

13. Which of the following statements is correct about rainbow?
    1) In primary rainbow, red colour is on the outside
    2) In primary rainbow, violet colour is on the outside
    3) In primary rainbow, violet colour is on the inside
    4) In primary rainbow, red colour is on the inside

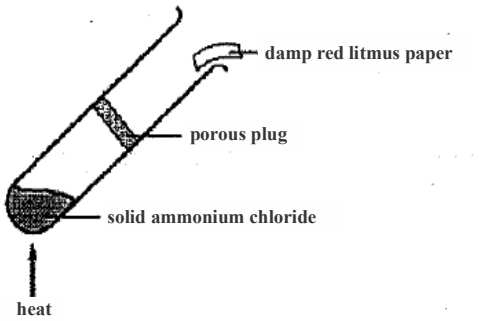
14. A strip of copper and another of germanium are cooled from room temperature to 30 K. The resistance of
    1) Copper strip increases
    2) Copper strip decreases
    3) Germanium decrease
    4) Germanium increases

15. Which of the following statements is/are wrong regarding electric motor ?
    1) Mechanical energy into electrical energy
    2) Mechanical energy into heat energy
    3) Electrical energy into heat energy
    4) Electrical energy into mechanical energy

CLASS : X CHEMISTRY

Single Correct Answer Type : 10 × 2 = 20M

16. Which of the following statements correctly describes sodium chloride?
    1) A chorine ion is bonded to the sodium ion which it donated its outermost electron to.
    2) A sodium atom with one outermost electron forms a single covalent bond with one chlorine atom, producing sodium chloride molecule.
    3) The attraction between oppositely charged sodium and chloride ions results in the charges being neutralised, forming sodium chloride crystal.
    4) The sodium chloride lattice consists of sodium ions and chloride ions, in which every chloride ion is bonded to one sodium ion.



17. Which of the following gases will not result in a change of pH value when dissolved in water?
    1) CO_2 2) HBr 3) NH_3 4) O_2

18. 25.0 cm3 of two separate acids HX and HY of same concentration 1.0 mol/dm^3 reacted with 0.5 g of calcium carbonate to form 14.5 cm^3 and 30.0 cm^3 of carbon dioxide respectively in two minutes.
    What conclusions can be made from the above statement?
    1) The volume of carbon dioxide produced at the end of the reaction is not the same.
    2) The solution of acid HY has a lower pH than the solution of acid HX.
    3) Acid HX contains higher number of H+ ions per unit volume as compared to acid HY.
    4) Reaction between to HY and calcium carbonate products a salt which reacts which reacts with more calcium carbonate to produce a larger volume of carbon dioxide.

19. Which of the following describes a step in the preparation of barium sulphate?
    1) Add excess barium carbonate into dilute suphuric acid, filter, wash and collect residue.
    2) Add excess barium hydroxide into dilute sulphuric acid, filter, wash and collect residue.
    3) Add barium carbonate into dilute nitric acid followed by ammonium sulphate before collecting the precipitate.
    4) Heat the filtrate to saturation, and then cool it till crystallisation occurs.

20. Which of the following is an example of a redox reaction?

1) $H_2 \rightarrow 2H^+ + 2e-$ 2) $N_2 + 3H_2 \rightarrow 2NH_3$

3) $Ca(OH)_2 + 2HCl \rightarrow CaCl_2 + 2H_2O$ 4) $Mg(NO_3)_2 + Na_2CO_3 \rightarrow MgCO_3 + 2NaNO_3$

21. Chromium is a transition metal used in flash bulbs. When the filament inside the bulb gets hot, chromium burns with a white light to form a mixture of chromium (II) oxide and chromium (III) oxide. These oxides can react with both acids and bases. Chromium has no reaction with water or steam.

Which statement shows that chromium is transition metal?

A) Chromium is unreactive.

B) The oxides of chromium are amphoteric.

C) Chromium oxide can react with acid to form a salt and oxygen only.

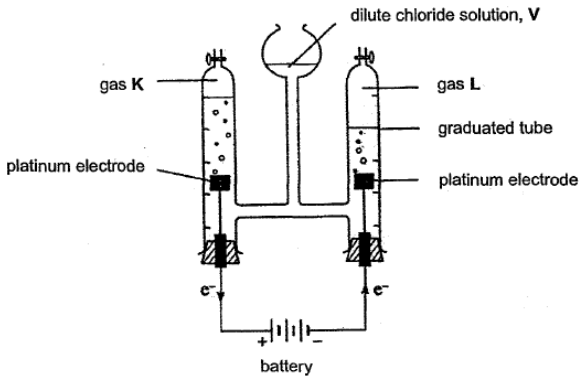
D) Chromium can form two different oxides.

1) (A) & (B) 2) (B) & (C) 3) (B) & (D) 4) (A), (B) & (D)

22. Which substance could be added to remove the sand impurities during the extraction of metal from its ore?

1) Slag 2) Hot air 3) Carbon 4) Calcium oxide

23. Gases K and L were two colourless gases produced during the electrolysis of a very dilute chloride solution, V. The electrolysis diagram of solution V is shown and some conclusions were made by a student at the end of the electrolysis.



Which of the following conclusions is correct?

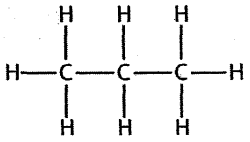
1) Gas L will extinguish a lighted splint with a 'pop' sound.

2) Gas K is very soluble and some of it has dissolved into the solution.

3) Gas L will turn moist blue litmus paper red.

4) Electrolyte solution after electrolysis turned red litmus paper blue.

24. Propane has the structure as shown below.



How many electrons in a molecule of propane is / are not involved in bonding?

1) 0 2) 4 3) 2 4) 6

25. In which reaction is sulphuric acid not acting as an acid?
    1) Formation of sodium sulphate by adding sodium carbonate
    2) Formation of magnesium sulphate by adding magnesium
    3) Formation of barium sulphate by adding aqueous barium hydroxide
    4) Formation of barium sulphate by adding aqueous barium nitrate

Multi Correct Answer Type : **5 × 3 = 15M**

26. Which of the following statements are correct about an endothermic reaction?
    a) The temperature of the surroundings decreases.
    b) The temperature of reactants increases.
    c) The products always have more energy than the reactants.
    d) The products formed are always unstable and explosive.
    1) a 2) b 3) c 4) d

27. What type of bonds are present in $FeSO_4 5H_2O$ molecule?
    1) Ionic bond 2) Covalent bond 3) Dative bond 4) Hydrogen bond

28. The following compounds can form only substitution products but not additional products?
    1) C_4H_{10} 2) C_3H_6 3) C_2H_6 4) C_5H_{12}

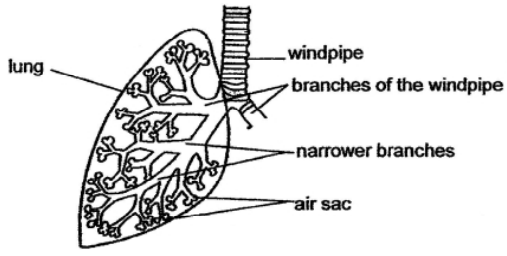
29. Rohith went to chemistry lab and observed four solutions A, B, C and D which are labelled with pH values 1, 9, 3 and 13 respectively.
    Which of the following statements about these solutions are correct?
    1) Solutions A and B will turn red litmus solution blue.
    2) Solution A is highly acidic while solution B is weakly basic.
    3) Solution B has lower concentration of hydroxyl ions than solution D.
    4) Solution A has higher concentration of hydrogen ions than solution C.

30. Which of the following are redox reactions?
    1) $CuO + H_2 \rightarrow Cu + H_2O$ 2) $CaCO_3 \rightarrow CaO + CO_2$
    3) $2KClO_3 \rightarrow 2KCl + 3O_2$ 4) $Mg + H_2SO_4 \rightarrow MgSO_4 + H_2$

CLASS : X BIOLOGY

Single Correct Answer Type : **15 × 2 = 30M**

31. Eshwari used the diagram below to study the structure of the human lungs.



    Based on her observations, she made the following statements.
    i) The air will pass from the windpipe into the air sac during inhalation.
    ii) The air sacs allow more air to be taken in by the lungs.
    iii) The air sacs help to increase the surface area for gaseous exchange in the lungs.
    Which of her statements are CORRECT ?
    1) (i) & (ii) 2) (i) & (iii) 3) (ii) & (iii) 4) (i), (ii) & (iii)

32. Which of the following statements about the human circulatory system are CORRECT?
    i) Oxygen-poor blood is returned to the heart before it reaches the lungs.
    ii) Oxygen-poor blood is returned directly to the lungs without reaching the heart first.
    iii) Contraction and relaxation of the muscles in the lungs help to move the blood around the body.
    iv) Contraction and relaxation of the muscles in the heart help to move the blood around the body.

    1) (i) & (iv) 2) (iii) & (iv) 3) (i), (ii)& (iv) 4) (i), (ii), (iii) & (iv)

33. Which statement(s) about reproduction in human is/are true?
    i) Reproduction is necessary to ensure survival of its own kind.
    ii) The human embryo usually develops inside the womb of the mother.
    iii) The male and female reproductive cells have to meet in the womb for fertilization to occur.

    1) (i) Only 2) (i) & (ii) 3) (ii) & (iii) 4) (i), (ii) & (iii)

34. Which of the following is TRUE for all spore-producing plants?
    i) They do not bear flowers.
    ii) They do not have chlorophyll.
    iii) They take in oxygen and give out carbon dioxide only.
    iv) They dispersed their spores with the help of insects or animals.

    1) (i) only 2) (i) & (ii) only 3) (i), (ii) & (iii) only 4) (i), (ii), (iii) & (iv)

35. Identify the MIS-MATCHED pair ?
    i) Potato-Eyes ii) Bryophyllum-Bulbs
    iii) Strawberry-Runners iv) Rose-Stem cutting

    1) (i) & (ii) 2) Only (iii) 3) Only (ii) 4) (iii) & (iv)

36. Match the following with CORRECT response.

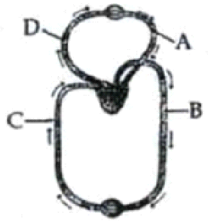
(a) Temporal lobe	(p) Speech facial muscular activites
(b) Parietal lobe	(q) Taste, smell touch and conscious association
(c) Occipital lobe	(r) Auditory reception
(d) Frontal lobe	(s) Visual perception

    1) a - q, b - s, c - p, d - r 2) a - p, b - r, c - q, d - s
    3) a - s, b - p, c - r, d - q 4) a - r, b - q, c - s, d - p

37. Which of the following take part in changing the volume of thoracic cavity
    (i) - External intercostals muscles (ii) - Diaphragm
    (iii) - Ribs (iv) - Internal intercostals muscles

    1) (ii) & (iii) 2) (i), (ii) & (iv) 3) (i) & (iii) 4) (i),(ii),(iii) & (iv)

38. Figure shows schematic plan of blood circulation in humans with labels A to D. Identify the label with its 'CORRECT' function/characteristic.



    1) B - Pulmonary Artery - takes blood from heart to lungs
    2) C - Vena cava - takes blood from body parts to right auricle
    3) D - Dorsal Aorta - takes blood from Heart to body parts
    4) A - Pulmonary Vein - takes impure blood from body parts

39. Match the following with correct response.

(a) Charles Darwin	(p) Gene is a part of chromosome
(b) Gregor Mendel	(q) Father of genetics
(c) Jananssen	(r) Theory of natural selection
(d) Sutton and Boveri	(s) Gene

1) a - r, b - q, c - s, d - p 2) a - q, b - s, c - p, d - r
3) a - p, b - r, c - q, d - s 4) a - s, b - p , c - s, d - q

40. Some of the oxygen molecules given off in the process of photosynthesis are used by the plant:
1) To form water by combining with hydrogen stored in the vacuoles
2) In cellular respiration in the mitochondria
3) To build enzymes in the Golgi complex
4) In transcribing DNA in the lysosome

41. Which of the following terms describes the closing of leaves or flowers at night?
1) Epinasty 2) Nyctinasty 3) Thermonasty 4) Thigmonasty

42. Arrange the following statements in the correct order to show how the circulatory system works in our body.
i) The heart pumps the blood back to the lungs.
ii) Blood that is now rich in oxygen flows to the heart.
iii) The heart then pumps the blood to the rest of the body.
iv) Blood that is rich in carbon dioxide flows back to the heart.
1) (i) - (iv) - (iii) - (ii) 2) (ii) - (iv) - (iii) - (i)
3) (iv) - (iii) - (i) - (ii) 4) (iv) - (i) - (ii) - (iii)

43. The given flowchart shows one of the pathway of glucose break-down. Identify 'P' and 'Q'

$$\text{Glucose} \xrightarrow{\text{In cytoplasm}} \text{P} \xrightarrow{\text{In muscle cells}} \text{Q} + \text{Energy}$$

1) Ethanol and carbon dioxide 2) Pyruvate and carbon dioxide
3) Pyruvate and lactate 4) Ethanol and pyruvate

44. Match the following with CORRECT response.
(a) Transmission of characters from parent to offspring
(b) Differences among the individual of same species
(c) Branch of science deals with heredity and variation
(d) Development of new organism by modifications in pre existing ones
(i) Hereditary (ii) Genetics (iii) Variation (iv) Evolution
1) a - (iii), b - (ii), c - (iv), d - (i) 2) a - (ii), b - (iv), c - (i), d - (iii)
3) a - (iv), b - (i), c - (iii), d - (ii) 4) a - (i), b - (iii), c - (ii), d - (iv)

45. The order of normal blood flow through the human heart is :
1) Right ventricle → Right atrium → Lungs → Left ventricle → Left atrium → Body parts
2) Right ventricle → Right atrium → Body parts → Left ventricle → Left atrium → Lungs
3) Right atrium → Right ventricle → Lungs → Left atrium → Left ventricle → Body parts
4) Right atrium → Right ventricle → Body parts → Left atrium → Left ventricle → Lungs

ALL THE BEST