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(SCHOLARS INTEGRAL MATHS & SCIENCE OLYMPIADS)



## BIGGEST NATIONAL LEVEL OLYMPIADS (STAGE - II) : 2018-19

**MAX. MARKS : 100**

**SISO QUESTION PAPER**

**TIME: 60 MIN.**

NAME OF THE STUDENT : .....

HALL TICKET NUMBER : .....

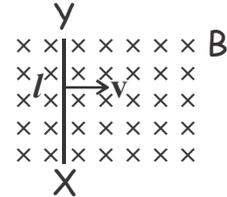
NAME OF THE SCHOOL : .....

### 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.com**.
- ☞ Stage-I branch result copy will be sent to the school mail id. Please contact your principal to know your result.

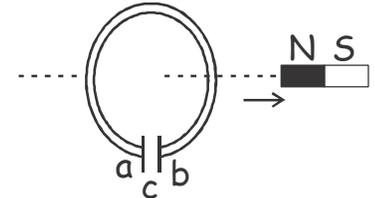


7. A small conducting rod of length  $l$ , moves with a uniform velocity  $v$  in a uniform magnetic field  $B$  as shown in figure.



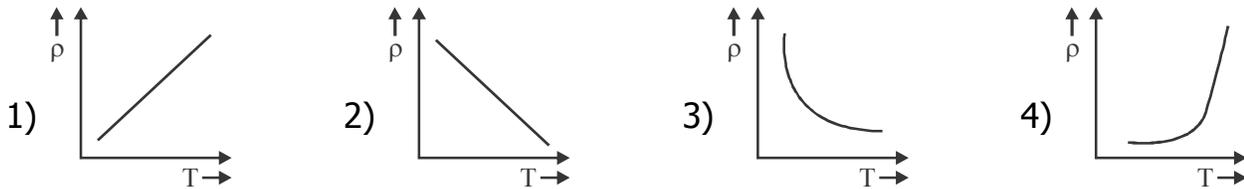
- 1) Then the end X of the rod becomes positively charged
- 2) The end Y of the rod becomes positively charged
- 3) The entire rod is unerringly charged
- 4) The rod becomes hot due to joule heating.

8. Consider the arrangements shown in figure in which the north pole of a magnet is moved away from a thick conducting loop containing capacitor. Then excess positive charge will arrive on

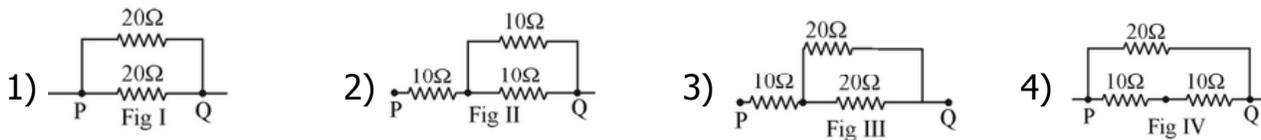


- 1) Plate a
- 2) Plate b
- 3) On both plate a and b
- 4) On neither plate a nor b

9. The temperature ( $T$ ) dependence of resistivity ( $\rho$ ) of a semi conductor is represented by



10. Which arrangement will provide a resistance of  $20 \Omega$  between points P and Q?



**Multi Correct Answer Type :**

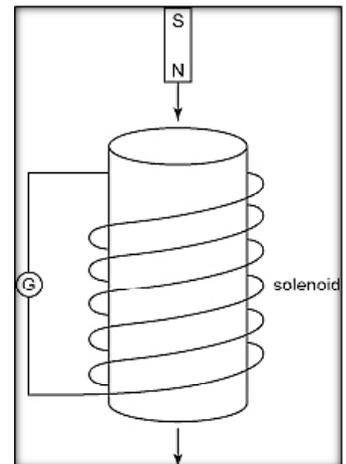
**$5 \times 3 = 15M$**

11. Match the following with correct response.

- 1) Convex lens is also known as converging lens
- 2) Concave lens is also known as diverging lens
- 3) Concave mirror produce virtual image larger than the object
- 4) Convex mirror produce virtual image smaller than the object

12. A bar magnet is dropped through a solenoid connected to a galvanometer, as shown. Which of these statements are true?

- 1) It falls slowly because of a repulsive force that pushed the magnet up
- 2) It accelerates as the induced magnetic field is in the same direction as that of the falling magnet
- 3) It falls slowly as the induced magnetic field is in the direction opposite to that of the falling magnet
- 4) It accelerates due to the induced magnetic field and earth's gravitational pull



13. Which of the following are correct?

- 1) Fleming's left hand rule gives the information about the direction of magnetic force on a current carrying conductor in a uniform magnetic field
- 2) Fleming's right hand rule gives the information about the direction of induced current.
- 3) Solenoid is similar to bar magnet
- 4) Electric generator cannot work on electromagnetic induction

14. A constant voltage is applied between two ends of a uniform conducting wire. If both the length and radius of the wire are doubled

- 1) The heat produced in the wire will be doubled
- 2) The electric field across the wire will be doubled
- 3) The heat produced will remain unchanged
- 4) The electric field across the wire will become one half

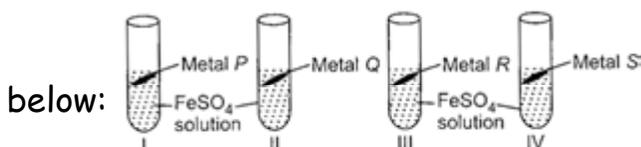
15. Which of the following is/are mismatched?

- 1) Iris regulates the amount of light
- 2) Ciliary muscles Increases or decreases the size of lens
- 3) Optic nerves - Forms image of an object
- 4) Retina - Send signal to the brain to interpret the signal

Single Correct Answer Type :

10 × 2 = 20M

16. Rohan took 10 mL of freshly prepared iron sulphate solution in four different test tubes and added four different metal strips to each test tube as shown



In test tubes I and III, black residue was

obtained while in test tubes II and IV, no change was observed. Metals P, Q, R and S could be respectively

- 1) Al, Cu, Pb, Ag
- 2) Pb, Cu, Ag, Al
- 3) Zn, Al, Cu, Ag
- 4) Zn, Cu, Al, Ag

17. Which of the following configurations violates Hund's rule?

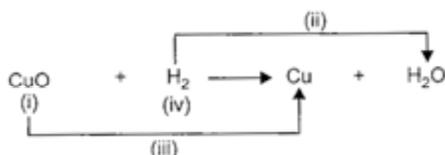


4) All of these

18. In the compound  $\text{CH}_2=\text{CH}-\text{CH}_2-\text{CH}_2-\text{CHO}$ , the  $\text{C}_3-\text{C}_4$  bond is of the type :

- 1)  $\text{sp}^3 - \text{sp}^2$
- 2)  $\text{sp}^3 - \text{sp}^3$
- 3)  $\text{sp}^2 - \text{sp}^2$
- 4)  $\text{sp}^2 - \text{sp}$

19. Observe the given reaction carefully and identify (i), (ii), (iii) and (iv)



- | (i)                    | (ii)      | (iii)     | (iv)                |
|------------------------|-----------|-----------|---------------------|
| 1) Undergoes oxidation | Oxidation | Reduction | Undergoes reduction |
| 2) Reducing agent      | Reduction | Oxidation | Oxidizing agent     |
| 3) Oxidizing agent     | Oxidation | Reduction | Reducing agent      |
| 4) Undergoes reduction | Reduction | Oxidation | Undergoes oxidation |
20. Certain chemical properties of a substance are given below.

- (i) It turns methyl orange red.  
 (ii) It turns turmeric paper red.  
 (iii) It reacts with zinc and a gas is evolved.  
 (iv) It reacts with solid sodium carbonate to give brisk effervescence.

Which of the above properties are shown by dilute HCl?

- 1) (i) and (ii) only      2) (i) and (iii) only      3) (i), (iii) and (iv) only      4) (iii) and (iv) only
21. Match column I (different substances) with column II (pH values) and choose the correct option from the codes given below.

Column I

- a) Tomato juice  
 b) Gastric juice  
 c) Blood  
 d) Saliva  
 e) Coffee

Column II

- p) 7.3-7.5  
 q) 6.5-7.5  
 r) 4.5-5.5  
 s) 4.0-4.4  
 t) 1.0-3.0

- 1) a-q, b-p, c-r, d-s, e-t      2) a-p, b-s, c-r, d-q, e-t  
 3) a-s, b-t, c-p, d-q, e-r      4) a-q, b-r, c-p, d-t, e-s
22. Which of the elements having following positions, have same number of valence electrons as that of element with atomic number 6?
- (i) Group 14 and period 5      (ii) Group 14 and period 4  
 (iii) Group 6 and period 4      (iv) Group 14 and period 3
- 1) (i) and (ii) only      2) (i), (ii) and (iii) only  
 3) (i), (ii) and (iv) only      4) All of these

23. Position of five elements P, Q, R, S and T is shown on the simplified form of the

periodic table.

1	2	3 to 12										13	14	15	16	17	18
																	T
	P															R	
	Q														S		

The element which has maximum tendency to lose electron, the element which has maximum tendency to gain electrons and the element which has no tendency to gain or lose electrons are respectively

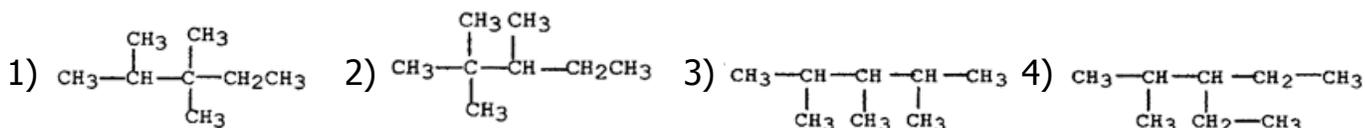
- 1) P, R and S      2) S, R and T      3) Q, S and P      4) Q, R and T

24. Which of the following statements are incorrect?

- The atomic radii increase along a period from left to right.
- In periodic table isotopes are given separate places.
- The oxides of metals are basic in nature.
- Na, Mg and Al belong to the same period.

- 1) i and iv only      2) ii and iv only      3) i and ii only      4) iii and iv only

25. The correct structure for 2, 3, 3-trimethylpentane is



**Multi Correct Answer Type :**

**5 × 3 = 15M**

26. Identify the non-permissible sets of quantum numbers from the following :

- $n = 3, l = 3, m = -2, s = +1/2$
- $n = 3, l = 1, m = -1, s = 1$
- $n = 3, l = 0, m = -1, s = -1/2$
- $n = 3, l = 0, m = 0, s = +1/2$

27. Which of the following is a balanced equation?

- $\text{Ca}(\text{HO})_2 + \text{CO}_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$
- $\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$
- $\text{KClO}_4 \rightarrow \text{KCl} + 2\text{O}_2$
- $\text{Cu} + 2\text{HNO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + 2\text{NO}_2 + \text{H}_2\text{O}$

28. Choose the incorrect statement among the following.

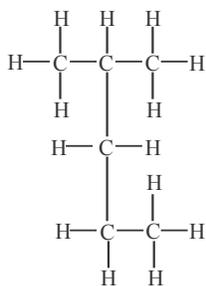
- Tamarind, tomato and sour milk are the natural sources of tartaric acid, acetic acid and lactic acid respectively
- The atmosphere of Venus is made up of thick white and yellowish clouds of sulphuric acid
- Bleaching powder is used for disinfecting drinking water
- Carbonic acid is an example of acidic salt

29. Identify the correct statements regarding co-ordinate covalent bond.

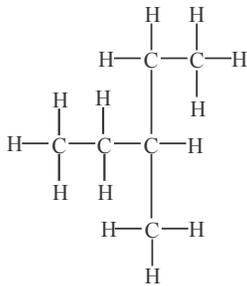
- Bonded electrons are contributed by only one atom
- Donor atoms in dative bond are Lewis bases
- Acceptor atoms in dative bond are Lewis acids
- Donor atoms are also called ligands

30. The structures of four alkanes are shown below.

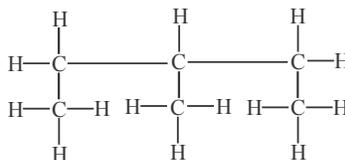
I:



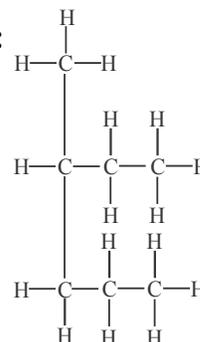
II:



III:



IV:

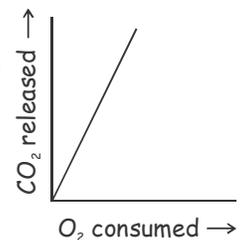


Which of these hydrocarbons have same name according to IUPAC ?

- 1) I, III and IV only      2) II and III only      3) I and IV only      4) II, III and IV only

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

31. Which of the following is NOT a function of glycolysis ?
- 1) Production of ATP
  - 2) Production of NADH
  - 3) Production of  $FADH_2$
  - 4) Formation of pyruvate
32. Beginning from the anterior (= superior) vena cava, what is the correct pathway of blood through the mammalian heart ? (R = right, L = left)
- 1) R atrium → R ventricle → pulmonary vein → lung circuit → pulmonary artery → L atrium → L ventricle → aorta
  - 2) L atrium → L ventricle → pulmonary artery → lung circuit → pulmonary vein → R atrium → R ventricle → R atrium
  - 3) R ventricle → R atrium → pulmonary artery → lung circuit → pulmonary vein → L atrium → L ventricle → aorta
  - 4) R atrium → R ventricle → pulmonary artery → lung circuit → pulmonary vein → L atrium → L ventricle → aorta
33. A man who carries an X-linked allele will pass it on to
- 1) All of his daughters
  - 2) Half of his daughters
  - 3) Half of his sons
  - 4) All of his children
34. If the haploid number for a species is three, each dividing diploid cell during mitosis will have how many chromatids at anaphase ?
- 1) 3
  - 2) 6
  - 3) 9
  - 4) 12
35. Which of the following best describes Darwin's theory of the mechanism of genetic inheritance?
- 1) Inheritance of acquired characteristics
  - 2) Blending inheritance
  - 3) Molecular inheritance
  - 4) Particular inheritance
36. In the absence of oxygen, cells capable of fermentation
- 1) No longer produce ATP
  - 2) Accumulate pyruvate
  - 3) Oxidize FAD
  - 4) Oxidize NADH to produce  $NAD^+$
37. The accompanying diagram depicts the amount of carbon dioxide release against the amount of oxygen consumed by a cell. Which of the following can be the substrate for respiration ?
- 1) Monosaccharies
  - 2) Organic acids
  - 3) Short chain fatty acids
  - 4) Long chain fatty acids



38. The tissue in plant seeds that serves the same nutritive function as yolk in chicken embryos is the

- 1) Seed coat
- 2) Endosperm
- 3) Epicotyl
- 4) Embryo

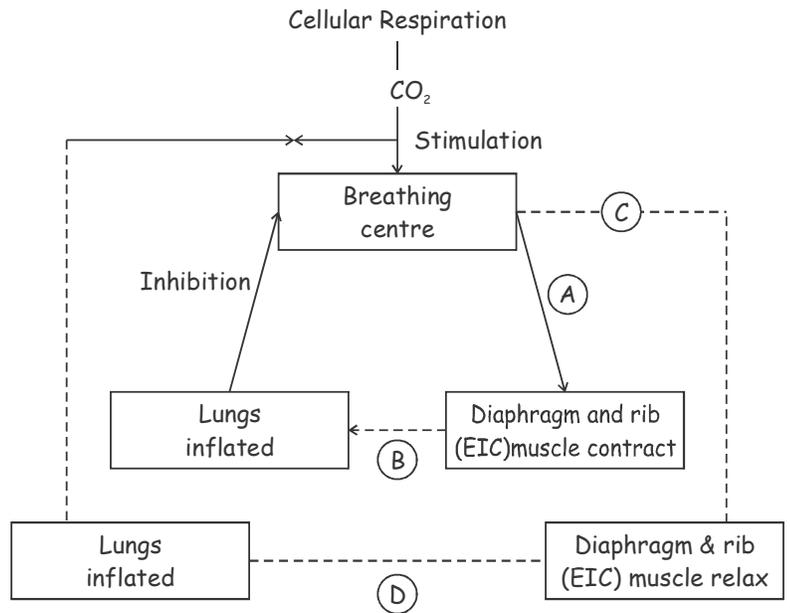
39. In the evolutionary theory of Darwin, environment plays an important role in

- 1) Cause of variation
- 2) Differential survival and reproduction
- 3) Selection of best adapted life forms
- 4) Both (1) and (3)

40. Identify the sequence of processes or condition, indicated below by roman numerals, matching with the alphabets A to D in the accompanying diagram.

- i) Exhalation
- ii) Inhalation
- iii) Impulses
- iv) No impulses

- 1) A : (iii), B : (ii), C : (iv), D : (i)
- 2) A : (ii), B : (iii), C : (iv), D : (i)
- 3) A : (iv), B : (i), C : (iii), D : (ii)
- 4) A : (i), B : (iv), C : (ii), D : (iii)



41. The pituitary gland by virtue of its tropic hormones controls the secretory activity of other endocrine glands. Which one of the following endocrine glands can function independent of the pituitary gland?

- 1) Adrenals                      2) Gonads                      3) Thyroid                      4) Parathyroid

42. The major chemical compound found in human kidney stones is

- 1) Calcium oxalate      2) Calcium cabonate      3) Uric acid                      4) Calcium sulphate

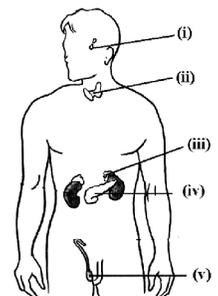
43. The given figure shows a human sperm. Various parts of it are labelled as a, b, c and d. Which labelled part represents acrosome?

- 1) a                                      2) b
- 3) c                                      4) d



44. The given figure represents the position of various endocrine glands in human body. Select the correctly labelled parts from the codes given below.

- |              |           |          |          |         |
|--------------|-----------|----------|----------|---------|
| (i)          | (ii)      | (iii)    | (iv)     | (v)     |
| 1) Thyroid   | Pituitary | Adrenal  | Pancreas | Testis  |
| 2) Pituitary | Thyroid   | Adrenal  | Pancreas | Testis  |
| 3) Pituitary | Thyroid   | Pancreas | Adrenal  | Testis  |
| 4) Thyroid   | Pituitary | Testis   | Pancreas | Adrenal |



45. Natural selection is often called "survival of the fittest". Which of the following statements best describes an organism fitness ?

- 1) The number of fertile offspring it has
- 2) How strong it is compared to other individuals of the same species
- 3) How The ability to adapt to the enviroment in the niche it occupies
- 4) How much food and resources it is able to gather for its offspring