

Read all the instructions carefully before answering your questions.  
You are not allowed to leave the exam hall before the end of the test.

### GENERAL INSTRUCTIONS

- This booklet is your question paper. Answers are to be marked in the provided OMR sheet.
- This question paper contains FIVE sections.
  - Section- I is **MATHEMATICS**,
  - Section - II is **PHYSICS**,
  - Section - III is **CHEMISTRY**,
  - Section–IV IS **BIOLOGY**,
  - Section – V is **APTITUDE**.
- There are a total of 100 questions.
- All questions are **Multiple Choice questions with single answer correct**.
- Each question carries **+4 marks** for correct answer, **No negative marks**

### FILLING OMR SHEET

Ensure all details in the OMR are filled before you start marking your answers.

On the OMR sheet, darken the appropriate bubble with **BALL POINT PEN ONLY**

Name of the Candidate :

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## Useful Data

## PHYSICS

|                             |                                                                  |
|-----------------------------|------------------------------------------------------------------|
| Acceleration due to gravity | : $g = 10 \text{ m/s}^2$                                         |
| Planck constant             | : $h = 6.6 \times 10^{-34} \text{ J-s}$                          |
| Charge of electron          | : $e = 1.6 \times 10^{-19} \text{ C}$                            |
| Mass of electron            | : $m_e = 9.1 \times 10^{-31} \text{ kg}$                         |
| Permittivity of free space  | : $\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2 / \text{N-m}^2$ |
| Density of water            | : $\rho_{\text{water}} = 10^3 \text{ kg/m}^3$                    |
| Atmospheric pressure        | : $P_a = 10^5 \text{ N/m}^2$                                     |
| Gas constant:               | $R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$                    |

## CHEMISTRY

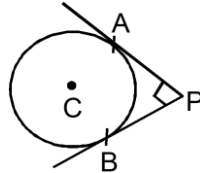
|                         |   |                                                       |
|-------------------------|---|-------------------------------------------------------|
| Gas Constant R          | = | $8.314 \text{ J K}^{-1} \text{ mol}^{-1}$             |
|                         | = | $0.0821 \text{ Lit atm K}^{-1} \text{ mol}^{-1}$      |
|                         | = | $1.987 \approx 2 \text{ Cal K}^{-1} \text{ mol}^{-1}$ |
| Avogadro's number $N_a$ | = | $6.023 \times 10^{23}$                                |
| Planck's constant h     | = | $6.625 \times 10^{-34} \text{ J.s}$                   |
|                         | = | $6.625 \times 10^{-27} \text{ erg.s}$                 |
| 1 Faraday               | = | 96500 coulomb                                         |
| 1 calorie               | = | 4.2 joule                                             |
| 1 amu                   | = | $1.66 \times 10^{-27} \text{ kg}$                     |
| 1 eV                    | = | $1.6 \times 10^{-19} \text{ J}$                       |

**Atomic No:** H = 1, He = 2, Li = 3, Be = 4, B = 5, C = 6, N = 7, O = 8, F = 9, Ne = 10, Na = 11, Mg = 12, Si = 14, Al = 13, P = 15, S = 16, Cl = 17, Ar = 18, K = 19, Ca = 20, Cr = 24, Mn = 25, Fe = 26, Co = 27, Ni = 28, Cu = 29, Zn = 30, As = 33, Br = 35, Ag = 47, Sn = 50, I = 53, Xe = 54, Ba = 56, Pb = 82, U = 92.

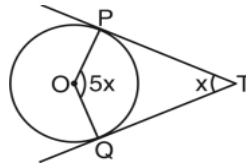
**Atomic masses:** H = 1, He = 4, Li = 7, Be = 9, B = 11, C = 12, N = 14, O = 16, F = 19, Na = 23, Mg = 24, Si = 28, Al = 27, P = 31, S = 32, Cl = 35.5, K = 39, Ca = 40, Cr = 52, Mn = 55, Fe = 56, Co = 59, Ni = 58.7, Cu = 63.5, Zn = 65.4, As = 75, Br = 80, Ag = 108, Sn = 118.7, I = 127, Xe = 131, Ba = 137, Pb = 207, U = 238.

Section – I – MATHEMATICS

- One of the factors of the expression  $x^4 + 8x$  is –  
 (a)  $x^2 + 2$  (b)  $x^2 + 8$  (c)  $x + 2$  (d)  $x - 2$
- If  $x + y + z = 1$ ,  $x^2 + y^2 + z^2 = 2$  and  $x^3 + y^3 + z^3 = 3$  then the value of  $xyz$  is –  
 (a)  $1/5$  (b)  $1/6$  (c)  $1/7$  (d)  $1/8$
- Find a point on the y-axis which is equidistant from the points  $A(6, 5)$  and  $B(-4, 3)$ .  
 (a)  $(0, 9)$  (b)  $(9, 0)$  (c)  $(0, -9)$  (d)  $(0, 3)$
- The value of  $\frac{9^x (9^{x-1})^x}{9^{x+1} \cdot 3^{2x-2}} \left\{ \frac{729^{\frac{x}{3}}}{81} \right\}^{-x} \div \frac{3^a - 2^3 \cdot 3^{a-2}}{3^a - 3^{a-1}}$  is –  
 (a) 9 (b) 6 (c) 12 (d) 16
- In Figure, PA and PB are two tangents drawn from an external point P to a circle with centre C and radius 4cm. If  $PA \perp PB$ , then the length of each tangent is –



- (a) 3 cm (b) 4 cm (c) 5 cm (d) 6 cm
- TP and TQ are the tangents to a circle, with centre O. Find  $x$ .



- (a)  $15^\circ$  (b)  $60^\circ$  (c)  $30^\circ$  (d)  $45^\circ$
- In a test, the marks obtained by 15 students are 34, 37, 44, 39, 45, 46, 35, 42, 48, 40, 39, 33, 43, 47, 44. The probability that a pupil chosen at random passed the test, if the passing marks are 40 is –  
 (a)  $\frac{8}{15}$  (b)  $\frac{3}{5}$  (c)  $\frac{7}{15}$  (d)  $\frac{11}{15}$
  - The solution of  $\frac{2x+3}{2x-1} = \frac{3x-1}{3x+1}$  is –  
 (a)  $\frac{1}{8}$  (b)  $-\frac{1}{8}$  (c)  $\frac{8}{3}$  (d)  $-\frac{8}{3}$
  - If  $a + b + c = 0$ , then what is the value of  $\frac{a^2 + b^2 + c^2}{(a-b)^2 + (b-c)^2 + (c-a)^2}$   
 (a) 1 (b) 3 (c)  $\frac{1}{3}$  (d) 0
  - If  $\frac{1}{7} + \frac{x}{7} = 3$ , then the value of  $x =$   
 (a) 20 (b) 7 (c) 3 (d) 1

## Section – II – PHYSICS

11. A vehicle moving on a straight road accelerates uniformly from 10 m/s to 25 m/s in 5 seconds. The total distance covered by the vehicle during this 5-second interval is –  
 (a) 37.5 m (b) 75.0 m (c) 87.5 m (d) 125.0 m
12. A pulley system is used to lift a load of 600 N vertically upward through a height by applying an effort force of 200 N. The Mechanical Advantage (MA) of this simple machine is –  
 (a) 0.33 (b) 3.00 (c) 4.00 (d) 1200.00
13. The velocity-time (v-t) graph of a toy car moving along a straight line consists of two phases –  
 1. It accelerates uniformly from rest (0 m/s) to a speed of 12 m/s in 4 seconds.  
 2. It immediately applies brakes and comes to rest with uniform retardation in the next 6 seconds. The average speed of the toy car over the entire 10-second journey is –  
 (a) 4.8 m/s (b) 6.0 m/s (c) 7.2 m/s (d) 12.0 m/s
14. A sprinter starts from rest and runs along a straight track under uniform acceleration. If  $S_1$  is the distance covered in the first 3 seconds and  $S_2$  is the distance covered in the next 3 seconds, the ratio  $S_1/S_2$  is –  
 (a) 1 : 1 (b) 1 : 2 (c) 1 : 3 (d) 1 : 4
15. A wooden box of mass 5 kg is being pushed horizontally on a flat floor with a forward force of 20 N. If the frictional force opposing the motion is 5 N, the net force acting on the box is –  
 (a) 5 N (b) 15 N (c) 20 N (d) 25 N
16. A horizontal net force acts on a stationary body of mass 2 kg lying on a frictionless floor. The momentum of the body increases linearly from 0 to 20 kg. m/s in a time duration of 4 seconds. The work done by this net force during these 4 seconds is –  
 (a) 50 J (b) 100 J (c) 200 J (d) 400 J
17. A pump lifts 600 kg of water vertically through a height of 10 m in 20 seconds and delivers it out with zero additional kinetic energy. Taking  $g = 10 \text{ m/s}^2$ , the power delivered by the pump is –  
 (a) 300 W (b) 1200 W (c) 3000 W (d) 6000 W
18. Consider the following statements regarding forces and motion along a straight line:  
 Statement I: When a ball is thrown vertically upward, its velocity is zero at the highest point, but the net force acting on it is not zero.  
 Statement II: If the net horizontal force on a moving object is zero, the object must immediately come to rest.  
 Statement III: Action and reaction forces described in Newton's Third Law act on two different bodies and therefore never cancel each other out.  
 Which of the statement(s) is/are CORRECT?  
 (a) Only III (b) Only I and III (c) Only II and III (d) All I, II, and III
19. Two stones A and B are on the same vertical line. Stone A is dropped from rest from a height of 80 m above the ground. At the exact same instant, Stone B is projected vertically upwards from the ground with an initial speed of 40 m/s. Taking  $g = 10 \text{ m/s}^2$ , the time elapsed before the two stones cross each other, and the height above the ground where they cross, are respectively –  
 (a)  $t = 2 \text{ s}$  at height 60 m (b)  $t = 2 \text{ s}$  at height 20 m  
 (c)  $t = 4 \text{ s}$  at height 40 m (d)  $t = 4 \text{ s}$  at height 20 m
20. A crate of mass 4 kg is initially at rest on a rough horizontal floor. The constant friction force opposing its motion is 8 N. A horizontal pulling force of 24 N is applied to the crate over a displacement of 5 meters. The final speed of the crate at the end of this 5-meter displacement is –  
 (a) 5 m/s (b)  $2\sqrt{10} \text{ m/s}$  (c)  $2\sqrt{15} \text{ m/s}$  (d) 10 m/s

## Section – III – CHEMISTRY

21. At 80°C, the solubility of a pure salt S is 60 g per 100 g of water. At 30°C, its solubility drops to 25 g per 100 g of water. Exactly 320 g of a saturated solution of salt S prepared at 80°C is cooled to 30°C. During this cooling process, 20 g of water accidentally evaporates. What is the exact mass of salt S that crystallizes out of the solution?
- (a) 75 g                      (b) 70 g                      (c) 50 g                      (d) 65 g
22. Element Z exists as two naturally occurring isotopes:  $^{79}\text{Z}$  and  $^{81}\text{Z}$ . The fractional average atomic mass of Z is calculated to be 79.8 u. If a neutral atom of element Z contains 35 electrons, determine the percentage abundance of the heavier isotope ( $^{81}\text{Z}$ ) and the ratio of neutrons to protons in the nucleus of a  $^{79}\text{Z}^{1-}$  anion.
- (a) 40% abundance; Neutron-to-proton ratio = 44 : 35  
(b) 60% abundance; Neutron-to-Proton ratio = 44 : 35  
(c) 40% abundance; Neutron-to-Proton ratio = 45 : 35  
(d) 60% abundance; Neutron-to-Proton ratio = 45 : 36
23. Solution X is prepared by dissolving 20 g of solute in 180 g of water. Solution Y is prepared by dissolving 60 g of the same solute in 140 g of water. If solution X and solution Y are mixed together, and then 100 g of water is evaporated from the resulting mixture, what is the final mass percentage concentration of the solution?
- (a) 26.7%                      (b) 20.0%                      (c) 25.0%                      (d) 32.0%
24. According to the Bohr-Bury scheme for electron distribution, consider the following statements:
- I. The maximum capacity of electrons in energy shell  $n$  is given by  $2n^2$ .  
II. Shells are filled in a step-wise manner from inner to outer shells.  
III. The outermost shell cannot accommodate more than 8 electrons, regardless of its shell number  $n$ .  
IV. Calcium ( $Z = 20$ ) has an electronic configuration of 2, 8, 10.
- Which combination of statements is strictly correct?
- (a) I, II and III only                      (b) I and II only                      (c) I, II and IV only                      (d) All I, II, III and IV
25. Liquid air at  $-200^\circ\text{C}$  is fed into a fractional distillation column and warmed slowly. The boiling points of Nitrogen, Argon and Oxygen are  $-196^\circ\text{C}$ ,  $-186^\circ\text{C}$  and  $-183^\circ\text{C}$ , respectively. As the temperature rises gradually from  $-200^\circ\text{C}$  to  $-180^\circ\text{C}$ , in what sequence are the gases collected?
- (a) Nitrogen boils off first at the top, followed by Argon, leaving liquid Oxygen at the bottom.  
(b) Oxygen boils off first at the top, followed by Argon, leaving liquid Nitrogen at the bottom.  
(c) Argon boils off first because its boiling point is between nitrogen and oxygen  
(d) All three gases vaporize simultaneously at  $-186^\circ\text{C}$
26. Why is crystallization preferred over thermal evaporation to obtain pure sugar crystals from an aqueous sugar solution?
- (a) Direct heating during evaporation causes sugar to char and decompose  
(b) Sugar sublimates into gas upon direct heating  
(c) Evaporation converts sugar into an insoluble suspension  
(d) Crystallization causes liquid impurities to evaporate faster

# RISE SCHOLARSHIP CUM ADMISSION TEST – SAMPLE PAPER

Class – 9<sup>th</sup> to 10<sup>th</sup>



27. Which option correctly pairs the radioisotope with its specific application in medicine or industry?
- (a) Cobalt 60 → Cancer treatment, Iodine-131 → Goitre treatment; Uranium-235 → Nuclear fuel  
(b) Cobalt 60 → Goitre treatment; Iodine-131 → Cancer treatment; Uranium-235 → Nuclear fuel  
(c) Cobalt-60 → Nuclear fuel; Iodine-131 → Cancer treatment; Uranium-235 → Goitre treatment  
(d) Cobalt-60 → Cancer treatment; Iodine-131 → Nuclear fuel; Uranium-235 → Goitre treatment
28. Which colloidal system is correctly matched with its respective physical classification?
- (a) Milk of Magnesia – Sol (Solid in Liquid) (b) Butter – Foam (Gas in Liquid)  
(c) Smoke – Gel (Liquid in Solid) (d) Shaving Cream – Aerosol (Liquid in Gas)
29. A separating funnel contains three immiscible liquids; Water (density 1.0 g/cm<sup>3</sup>), Kerosene (density 0.8 g/cm<sup>3</sup>), and Chloroform (density 1.5 g/cm<sup>3</sup>). When the stopcock at the bottom is opened, which liquid drains out FIRST?
- (a) Chloroform (b) Water  
(c) Kerosene (d) All the three drains together as a single mixture
30. A divalent cation  $X^{2+}$  contains 18 electrons and 20 neutrons. What are the atomic number (Z) and the mass number (A) of neutral element X?
- (a) Z = 20, A = 40 (b) Z = 18, A = 38 (c) Z = 16, A = 36 (d) Z = 20, A = 38

## Section – IV – Biology

31. Who discovered the cell for the first time?
- (a) Robert Hooke (b) Leeuwenhoek (c) Robert Brown (d) Purkinje
32. Which of the following is called the "suicidal bag" of the cell?
- (a) Ribosome (b) Lysosome (c) Peroxisome (d) Vacuole
33. The jelly-like substance present between the cell membrane and the nucleus is called:
- (a) Nucleoplasm (b) Cytoplasm (c) Protoplasm (d) Cell
34. A cell placed in a hypotonic solution will:
- (a) Shrink (b) Swell up and burst (if animal cell)  
(c) Remain unchanged (d) First shrink, then swell
35. Which of the following organelles is correctly matched with its function?
- (a) Golgi apparatus – Synthesis of proteins (b) Rough ER – Synthesis of lipids  
(c) Mitochondria – Production of ATP (d) Plastids – Storage of cell sap
36. If the plasma membrane of a cell is damaged, which function will be directly affected first?
- (a) Synthesis of proteins (b) Respiration  
(c) Regulation of entry and exit of substances (d) Formation of spindle fibres
37. Which of the following is not a characteristic of a prokaryotic cell?
- (a) Nuclear membrane absent (b) Membrane-bound cell organelles absent  
(c) DNA is circular (d) Mitochondria are present
38. Why do plant cells have fewer mitochondria than animal cells?
- (a) They do not need energy  
(b) They have chloroplasts to produce all energy directly  
(c) They rely mostly on anaerobic respiration

# RISE SCHOLARSHIP CUM ADMISSION TEST – SAMPLE PAPER

Class – 9<sup>th</sup> to 10<sup>th</sup>



- (d) They have a cell wall that produces ATP
39. A scientist treats a living plant cell with a chemical that completely blocks the function of its mitochondria. Which of the following would be the most immediate observable effect?
- (a) The cell stops photosynthesis immediately
  - (b) The cell wall begins to disintegrate
  - (c) The cell's energy supply (ATP) drops drastically, affecting all active transport and metabolic activities
  - (d) The nucleus shrinks and stops controlling the cell
40. Consider the following statements about ribosomes:
- (i) They are found attached to the Rough ER and also freely in the cytoplasm
  - (ii) They are responsible for protein synthesis in both prokaryotes and eukaryotes
  - (iii) They are membrane-bound organelles
  - (iv) They contain DNA as their genetic material
- Which of the above statements are correct?
- (a) (i), (ii) and (iv) only
  - (b) (i) and (ii) only
  - (c) (ii) and (iii) only
  - (d) (i), (iii) and (iv) only

## Section – V – Aptitude

41. The timetable of a class with five periods is so set that the fourth period is of a language. Mathematics is just before Geography. The period of Science is not the first or the last. The order of the periods is –
- (a) Mathematics, Science, Geography, Malayalam, History
  - (b) Science, History, Mathematics, Kannada, Geography
  - (c) Mathematics, Geography, Science, Marathi, History
  - (d) Mathematics, Geography, History, Sanskrit, Science
42. Sohan drinks 20% of the milk present in a bottle in one sip. How much milk will remain in the bottle after the first 3 sips, if it contained 1 litre milk to begin with?
- (a) 400 ml
  - (b) 512 ml
  - (c) 600 ml
  - (d) 625 ml
43. In a group of 6 persons of unequal heights, D is shorter than A and C, but taller than E and F. Two persons are taller than B, and one person is shorter than E. Which of the following inferences is NOT NECESSARILY valid?
- (a) A is the tallest of all
  - (b) C is taller than B
  - (c) F is the shortest of all
  - (d) B is taller than D
44. The addition of a three-digit number and the number with the same digits in reverse order, is 1089. The middle digit of that number must be –
- (a) 9
  - (b) 8
  - (c) 0
  - (d) 4
45. What would be the minimum number of notes for Rs 4849 if notes are available only in denominations of Rs 2, 5, 20, 50, 500?
- (a) 19
  - (b) 20
  - (c) 21
  - (d) 22
46. Select the option that will correctly replace the question mark (?) in the following series.  
W90D, S135H, O180L, K225P, G270T?
- (a) D315X
  - (b) C325X
  - (c) D315Y
  - (d) C315X

# RISE SCHOLARSHIP CUM ADMISSION TEST – SAMPLE PAPER

Class – 9<sup>th</sup> to 10<sup>th</sup>



47. Find the next term in the following series.  
5I, 7J, 11L, 17O,?  
(a) 25S (b) 25Y (c) 20P (d) 18C
48. If in a certain language, MADRAS is coded as NBESBT, how is BOMBAY coded in that code?  
(a) CPNCBX (b) CPNCBZ (c) CPOCBZ (d) CQOCBZ
49. In a certain code 'SAND' is written as 'UCPF'. How is 'STONE' written in that code?  
(a) SRLFE (b) UNSOP (c) UVQPG (d) UDLPQ
50. The difference of the squares of two distinct two-digit numbers with one being obtained by reversing the digits of the other is always divisible by –  
(a) 4 (b) 6 (c) 10 (d) 11

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## ANSWER KEY

|    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|
| 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 |
| C  | B  | A  | B  | B  | C  | B  | B  | C  | A  |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| C  | B  | B  | C  | B  | B  | C  | B  | A  | B  |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| A  | A  | A  | A  | A  | A  | A  | A  | A  | A  |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| A  | B  | B  | B  | C  | C  | D  | B  | C  | B  |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| C  | B  | A  | A  | B  | D  | A  | B  | C  | D  |