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	**:**		
Roll Number	**:**		
Date of Examination	**:**	***Centre :***	

Useful Data

PHYSICS

Acceleration due to gravity	: g = 10 m/s^2
Planck constant	: h = 6.6 × 10^{-34} $J-s$
Charge of electron	: e = 1.6 × 10^{-19} C
Mass of electron	: $m_e = 9.1\times10^{-31}\,kg$
Permittivity of free space	: $\varepsilon_0 = 8.85\times10^{-12}\,C^2/N-m^2$
Density of water	: $\rho_{water} = 10^3\,kg/m^3$
Atmospheric pressure	: $Pa = 10^5\,N/m^2$
Gas constant:	R = 8.314 J K^{-1} mol^{-1}

CHEMISTRY

Gas Constant R	=	8.314 J $K^{-1}mol^{-1}$
	=	0.0821 Lit atm $K^{-1}mol^{-1}$
	=	1.987 ≈ 2 Cal $K^{-1}mol^{-1}$
Avogadro's number N_a	=	6.023 × 10^{23}
Planck's constant h	=	6.625 ×10^{-34} $J.s$
	=	6.625 ×10^{-27} $erg.s$
1 Faraday	=	96500 coulomb
1 calorie	=	4.2 joule
1 amu	=	1.66 ×10^{-27} kg
1 eV	=	$1.6\times10^{-19}\,J$

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.

RISE SCHOLARSHIP CUM ADMISSION TEST – SAMPLE PAPER

Class – 10th to 11th

Rani Institute of Scholastic Education

Section – I – MATHEMATICS

1. If α and β are two roots of the equation $x^2 - 64x + 256 = 0$. Then the value of $\left(\frac{\alpha^3}{\beta^5}\right)^{\frac{1}{8}} + \left(\frac{\beta^3}{\alpha^5}\right)^{\frac{1}{8}}$

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

2. If a, b, and c are non-zero real numbers such that the quadratic equation $ax^2 + bx + c = 0$ and the equation $x^2 + x + 1 = 0$ share a common root, what is the value of $\frac{a^3+b^3+c^3}{abc}$?

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

3. Let α and β be the roots of the quadratic equation $x^2 - 3x + 1 = 0$ If $P_n = \alpha^n + \beta^n$ for any integer n ≥ 1, what is the exact value of the expression $\frac{P_6+P_4}{P_5}$

   (a) 1 (b) 2 (c) 3 (d) 5

4. Let S_n denote the sum of the first n terms of an A.P. If $S_4 = 16$ and $S_6 = -48$, then S_{10} is equal to –

   (a) −320 (b) −380 (c) − 460 (d) −210

5. The common difference of the A.P.: $a_1, a_2, \ldots, a_m$ is 13 more than the common difference of the A.P.: $b_1, b_2, \ldots, b_n$. If $b_{31} = -277$, $b_{43} = -385$ and $a_{78} = 327$, then a_1 is equal to –

   (a) 21 (b) 19 (c) 24 (d) 16

6. Let α, β be the roots of the equation $x^2 + 2\sqrt{2x} - 1 = 0$. The quadratic equation whose roots are $\alpha^4 + \beta^4$ and $\frac{1}{10}(\alpha^6 + \beta^6)$, is –

   (a) $x^2 - 180x + 9506 = 0$ (b) $x^2 - 195x + 9506 = 0$

   (c) $x^2 - 190x + 9466 = 0$ (d) $x^2 - 195x + 9466 = 0$

7. Two positive integers a and b, with $a > b$, have HCF 12 and LCM 720. If $a - b = 132$ then the value of $a + b$ is –

   (a) 216 (b) 228 (c) 240 (d) 252

8. If x is an acute angle and $\sin x \cos x = \frac{1}{4}$, then the value of $\tan x + \cot x$ is –

   (a) 2 (b) 3 (c) 4 (d) 5

9. Two points A and B lie on the same straight line with the foot O of a tower, with A between B and O. The angles of elevation of the top of the tower from A and B are 60° and 30°, respectively. If AB = 30 m, the height of the tower is –

   (a) $15\sqrt{3}$ m (b) $20\sqrt{3}$ m (c) $30\sqrt{3}$ m (d) $45\sqrt{3}$ m

10. The point $P(x, y)$ divides the line segment joining $A(2, -3)$ and $B(8, 9)$ internally in the ratio 1 : 2. The value of $x + y$ is –

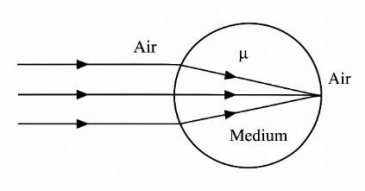
    (a) 4 (b) 5 (c) 6 (d) 7

Section – II – PHYSICS

11. A ray of light is incident at an angle of 60° on one face of a rectangular glass slab of thickness 0.1 m and refractive index 1.5. The lateral shift produced is approximately –

(a) 0.0257 m (b) 0.0513 m (c) 0.0750 m (d) 0.0866 m

12. Parallel rays of light travelling through air are incident on a spherical refracting surface and converge to a point on the principal axis inside the medium, as shown in the figure. If the radius of curvature of the surface is R, the refractive index μ of the medium is –



(a) 1.5 (b) 2 (c) 2.5 (d) 3

13. An object 2 cm high is placed at a distance of 16 cm from a concave mirror. It produces a real image 3 cm high. The focal length and image distance of the mirror are respectively –

(a) −9.6 cm, −24 cm (b) −24 cm, −9.6 cm (c) +9.6 cm, +24 cm (d) −12 cm, −24 cm

14. The refractive index of water with respect to air is 4/3, while that of glass with respect to air is 3/2. The refractive index of glass with respect to water is –

(a) 8/9 (b) 9/8 (c) 3/2 (d) 2

15. The near point of an elderly person is 50 cm from the eye. The far point is at infinity. What focal length and power of the correcting lens are required so that the person can see an object at 25 cm clearly?

(a) +25 cm, +4 D (b) +50 cm, +2 D (c) −50 cm, −2 D (d) +100 cm, +1 D

16. A ray of light is incident normally on one face of a prism of apex angle 30°. The refractive index of the prism material is $\sqrt{2}$. The angle of deviation produced by the prism is –

(a) 15° (b) 30° (c) 45° (d) 60°

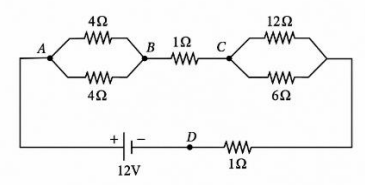
17. Two heater wires have the same dimensions and are made of the same material. They are first connected in series and then in parallel to the same source of voltage V for the same time interval. The ratio of heat produced in the two cases, H-series/H-parallel, is –

(a) 1:2 (b) 1:4 (c) 2:1 (d) 4:1

18. In a particular television tube, a beam of electrons is emitted with a current of 80 μA. The number of electrons striking the screen every second is: ($e = 1.6 \times 10^{-19}$ C)

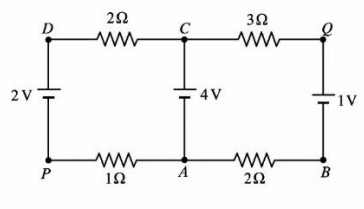
(a) 5×10^{12} (b) 5×10^{13} (c) 5×10^{14} (d) 8×10^{14}

19. A network of resistors is connected to a 12 V battery as shown in figure. The potential differences V_{AB}, V_{BC}, V_{CD}, respectively, are –



(a) 3 V, 1.5 V, 7.5 V (b) 1.5 V, 3 V, 7.5 V (c) 3 V, 3 V, 6 V (d) 2 V, 1 V, 9 V

20. For the circuit shown in the source, the potential difference between points P and Q is –



(a) 1 V (b) 2 V (c) 3 V (d) 4 V

Section – III – CHEMISTRY

21. Which of the following is not a combination reaction?
(a) $C + O_2 \longrightarrow CO_2$ (b) $H_2 + O_2 \longrightarrow H_2O$
(c) $CH_4 + O_2 \longrightarrow CO_2 + H_2O$ (d) All of these

22. Which will be an endothermic reaction?
(a) $N_2 + 3H_2 \longrightarrow 2NH_3$ (b) $CaO + CO_2 \longrightarrow CaCO_3$
(c) $SO_3 \longrightarrow SO_2 + O_2$ (d) $H_2 + O_2 \longrightarrow H_2O$

23. Zinc sulphide heating with Aluminum phosphide gives zinc phosphide and aluminium sulphide. On balancing this reaction, the coefficient of Zinc sulphide and Aluminum phosphide, will be in the ratio
(a) 1 : 1 (b) 2 : 1 (c) 3 : 2 (d) 2 : 3

24. $FeSO_4 + KMnO_4 + H_2SO_4 \longrightarrow Fe_2(SO_4)_3 + K_2SO_4 + MnSO_4 + H_2O$
On balancing this reaction, with smallest possible whole numbers, the coefficient of H_2O will be
(a) 8 (b) 10 (c) 4 (d) 18

25. pH of a 0.05 M Sulphuric acid solution will be –
(a) 1.5 (b) 13 (c) 5 (d) 1

26. $Fe_2O_3 + Cr \longrightarrow Cr_2O_3 + Fe$. In the above reaction, the reducing agent is –
(a) Iron (b) Chromium
(c) Oxygen (d) It is not a redox reaction

27. Which of the following reactions will change the colour of the solution to colourless?
(a) $CuSO_4 + Fe$ (b) $FeSO_4 + Cu$ (c) $CuSO_4 + Zn$ (d) $FeSO_4 + Ag$

28. Which among the following metals has the least oxidising properties?
(a) Fe (b) Zn (c) Al (d) Cu

29. The solution which turns blue litmus to red may have a pOH of –
(a) 13 (b) 7 (c) 2 (d) All of these

30. The acidic salt among the following is –
(a) Na_2CO_3 (b) $KHCO_3$ (c) $NaHSO_4$ (d) NH_4NO_3

Section – IV – Biology

31. A stomata closes when –

(I) It needs carbon dioxide for photosynthesis.

(II) It does not need carbon dioxide for photosynthesis.

(III) Water flows out of the guard cells.

(IV) Water flows into the guard cells

The correct reason(s) in this process is/are:

(a) (i) only (b) (i) and (iii) (c) (ii) and (iii) (d) (ii) and (iv)

32. Which of the following statement(s) is (are) true about human heart?

(A) Right atrium receives oxygenated blood from lungs through pulmonary artery.

(B) Left atrium transfers oxygenated blood to left ventricle which sends it to various parts of the body.

(C) Right atrium receives deoxygenated blood from different parts of the body through vena cava.

(D) Left atrium transfers oxygenated blood to aorta which sends it to different parts of the body.

(a) (B) only (b) (A) and (D) (c) (B) and (C) (d) (B) and (D)

33. The stomach in the gastrointestinal tract is –

(A) protected by a mucus layer (B) a fat absorption organ

(C) thick-walled (D) a chyme forming organ

(a) B, C and D (b) A, B and D (c) A, C and D (d) A, B, C and D

34. A disaccharide present in the milk of mammals is known as –

(a) fructose (b) galactose (c) glucose (d) lactose

35. The correct path of lymph flow is –

A. Lymph capillaries → Lymph vessels →Veins

B. Lymph capillaries → Lymph vessels → Arteries

(a) Only A is correct (b) Only B is correct

(c) Both A and B are correct (d) Both A and B are incorrect

36. What will happen to the body of an adult human being, if his spleen is removed?

(a) RBC production will be reduced (b) Antibodies production will be less

(c) WBC production will be less (d) Recycling of dead RBCs would not be possible

37. Which of the following statements is true regarding communication in neurons.

(a) An electric impulse travels along the length of axon. The electric impulse is converted to a chemical signal at the synapse.

(b) An electrical signal is converted to a chemical signal by the Myelin sheath before it reaches the synapse.

(c) Free electrons are moved along the plasma membrane of the axon and control the expression of neurotransmitters.

(d) A chemical signal travels along the axon and is converted into an electric impulse at the synapse.

38.. Assertion A: The hypothalamus helps regulate body temperature by acting on the autonomic nervous system and other mechanisms like sweating or shivering.

Reason R: The hypothalamus plays a key role in regulating the release of hormones from the pituitary gland, which controls various functions like growth, reproduction and metabolism.

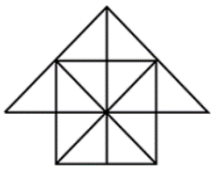
(a) Both A and R are true, but R is NOT the correct explanation of A
(b) A is true but R is false
(c) A is false but R is true
(d) Both A and R are false

39. The Bundle of His conducts impulses from the –
(a) SA node to atria (b) AV node to ventricular septum
(c) Purkinje fibres to atria (d) Brain to SA node

40. The cells that are full of water and rigid are called –
(a) support cells (b) flaccid (c) turgid (d) none of these

Section – V – Aptitude

41. In the following question, count the number of triangles and squares in the given figure.



(a) 26 triangles, 5 squares (b) 28 triangles, 5 squares
(c) 28 triangles, 6 squares (d) 26 triangles, 6 squares

42. Can you guess this number?
The number is not an odd number.
It has exactly four factors.
If you reverse the digits, a prime number is formed.
The sum of the digits is a two digit prime number.
The number is less than the square root of 104.
One of the digits is a square number.
Then the unit place of the required number is –
(a) 7 (b) 4 (c) 5 (d) 3

43. A child was looking for his father. He went 90 metres in the East before turning to his right. He went 20 metres before turning to his right again to look for his father at his uncle's place 30 metres from this point. His father was not there. From here he went 100 metres to the North before meeting his father in a street. How far did the son meet his father from the starting point?
(a) 80 metres (b) 100 metres (c) 140 metres (d) 260 metres

44. Elizabeth visits her friend Andrew and then returns home by the same route. In her route, she walks 2km/h when going uphill, 6km/h when going downhill and 3km/h when on level ground. If her total walking time is 6 hours, then what is the total distance she walks in km?
(a) 18 km (b) 20 km (c) 16 km (d) 22 km

45. In a certain code language 'BOOK' is coded as 'DMRH' and 'WELL' is coded as 'YCOI'. How will 'TREE' be coded in the same language?
(a) VSHC (b) UPHC (c) VPHB (d) UQHB

46. 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

47. 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

48. Find out the missing number in the following number series: 406, 626, 896, 1216, 1586,?

(a) 2006 (b) 2146 (c) 2046 (d) 1956

49. Arrange the following words as per order in the dictionary:
1. Inhabit 2. Ingenious 3. Inherit 4. Influence 5. Infatuation

(a) 1,2,3,4,5 (b) 5,4,1,2,3 (c) 4,5,2,1,3 (d) 5,4,2,1,3

50. If there is rainfall in a village, flowers will bloom. If flowers bloom, celebrations will definitely take place. Flowers did not bloom. Which of the following is certain?

(a) Celebrations took place (b) Celebrations did not take place

(c) It did not rain (d) It rained too much

******

ANSWER KEY

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