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Level - 1 : All Level-1 successful* participants will get certificate, aptitude report and online subscription, and school toppers will be eligible for school hero medals.

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*# See prospectus/website for details.

1. You are allowed additional 10 minutes to fill the required details in the **RESPONSE SHEET (OMR)**.
2. The question paper is made as per syllabus guidelines & pattern given in the information Booklet. The Question Paper for Classes 1 to 6 contains 25 Questions each to be answered in 40 minutes. The Question paper for classes 7 to 12 contains 50 Questions each to be answered in 60 minutes. All questions are compulsory. Further instructions are given in the instruction letter to the teacher.
3. Use the response sheet to mark your responses by darkening the required circle. The response sheet has to be returned to the foundation, duly filled in. **THE STUDENT CAN RETAIN THE QUESTION PAPER.**

EHF
NATIONAL
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N I P O

11
Class

A1
Paper
Code

L E V E L - 1

PHYSICS

1. A body of mass m rises to a height $h = R/5$ from the earth's surface, where R is the earth's radius. If g is acceleration due to gravity at earth's surface the increase in potential energy is
 - (1) $5/4 mgh$
 - (2) $4/5 mgh$
 - (3) $5/6 mgh$
 - (4) None of these
2. A block of mass 5 kg is moving horizontally with a speed of 1.5 m/s. A perpendicular force of 5 N acts on it for 4 sec. What will be the distance of the block from the point where the force started acting?
 - (1) 10 m
 - (2) 8 m
 - (3) 6 m
 - (4) None of these
3. In order to double the frequency of the fundamental note emitted by a stretched string, the length is reduced to $3/4$ th of the original length and the tension is changed. The factor by which the tension is to be changed, is
 - (1) $3/8$
 - (2) $2/3$
 - (3) $9/4$
 - (4) None of these
4. When the displacement is half of the amplitude, then what fraction of total energy of a simple harmonic oscillator is kinetic ?
 - (1) $3/4$ th
 - (2) $2/7$ th
 - (3) $5/7$ th
 - (4) None of these

5. There are two spherical balls A and B of the same material with same surface finish, but the diameter of A is half that of B. If A and B are heated to the same temperature and then allowed to cool, then
- Rate of cooling is same in both
 - Rate of cooling of A is four times that of B
 - Rate of cooling of A is $1/4$ times that of B
 - None of these
6. A piece of lead of specific heat 0.03 falls from height of 20m. If on reaching the ground 50% of its energy is converted into heat, then the rise in its temperature will be
- 12.5°C
 - 0.77°C
 - 10.4°C
 - None of these
7. Two droplets merge with each other and form a large droplet. In this process
- Energy is liberated
 - Energy is absorbed
 - Neither liberated nor absorbed
 - None of these
8. When a gas in a closed vessel was heated so as to increase its temperature by 5°C , there occurred an increase of 1% in its pressure. The original temperature of the gas was
- 500°C
 - 273°C
 - 227°C
 - None of these
9. A spherical source of power 4W and frequency 800 Hz is emitting sound waves. The intensity of waves at a distance 200m is
- $8 \times 10^{-6} \text{ W/m}^2$
 - $2 \times 10^{-4} \text{ W/m}^2$
 - $1 \times 10^{-4} \text{ W/m}^2$
 - None of these
10. In stationary wave
- Strain is maximum at nodes
 - Strain is maximum at antinodes
 - Strain is minimum at nodes
 - None of these
11. A simple pendulum is used on earth and moon. Then
- Its period will be the same in both the places because its mass is the same.
 - The results will be the same if the pendulum is displaced through the same angle.
 - The periods will be the same if the pendulum is displaced through the same angle.
 - None of these
12. A 25 cm long tube closed at one end is lowered, with the open end down, into a freshwater lake. If one-third of the tube is filled with water, the distance between the surface of the lake and level of water in the tube is:
- 4.20 m
 - 5.10 m
 - 5.82 m
 - None of these
13. A tuning fork of frequency 340 Hz is sounded above a cylindrical tube 1 m high. Water is slowly poured into the tube. If the speed of sound is 340 ms^{-1} , at what levels of water in the tube will the sound of the fork be appreciably intensified ?
- 25 cm, 75 cm
 - 20 cm, 80 cm
 - 15 cm, 85 cm
 - None of these
14. A P-V graph was drawn from state 1 to 2 when a given mass of a gas was subjected to temperature changes. During the process, the gas is
- Heated continuously
 - Cooled continuously
 - Heated in the beginning and cooled towards end
 - None of these
15. A child swinging on a swing in sitting position, stands up, then the time period of the swing will
- Increase
 - Decrease
 - Remain same
 - None of these

CHEMISTRY

16. The number of moles of KMnO_4 that will be needed to react with 1 mole of sulphite ion in acidic solution is
- $2/5$
 - $3/5$
 - $4/5$
 - None of these
17. Under what conditions does a real gas behave nearly as ideal gases :
- At high pressure and low temperature
 - At low pressure and high temperature
 - At low pressure and low temperature
 - None of these

- 18.** Compared to the mass of H_2 gas in cylinder A, the mass of the CO_2 in the cylinder B is :
- (1) Less (2) The same
(3) Greater (4) None of these
- 19.** In the molecule OF_2 , what type of hybrid orbitals are used on the oxygen atom and atoms are used to form localized bond orbitals :
- (1) sp^3 and 2p (2) sp^3 and 2s
(3) sp and 2p (4) None of these
- 20.** The bonds present in N_2O_5 are
- (1) Only ionic
(2) Covalent and coordinate
(3) Only covalent
(4) None of these
- 21.** The heat released when NH_4OH & HCl neutralise is:
- (1) < 13.7 Kcal (2) > 13.7 Kcal
(3) 13.7 Kcal (4) None of these
- 22.** When excess of ammonia is reacted with chlorine, the product formed will be :
- (1) N_2 (2) NCl_3
(3) NO_2 (4) None of these
- 23.** When borax is strongly heated, it gives :
- (1) B_2O_3 (2) $Na_2B_4O_7$
(3) $NaBO_2 + B_2O_3$ (4) None of these
- 24.** Which one of the following is a sulphide ore ?
- (1) Cerrusite (2) Siderite
(3) Zinc blende (4) None of these
- 25.** Black HgS :
- (1) Dissolves on boiling with conc. HCl
(2) Does not dissolve in boiling HCl + a crystal of $KClO_3$
(3) Dissolves in $NaOH$ solution
(4) None of these
- 26.** The compound with highest boiling point is
- (1) *n*-Hexane (2) *n*-Butane
(3) Propane (4) None of these
- 27.** Which one of the following is a suitable possible condition for the chlorination of methane in dark?
- (1) In the presence of peroxide
(2) Using tetra ethyl lead at $120^\circ C$
(3) Both (1) and (2)
(4) None of these
- 28.** Which one of the following statements is incorrect ?
- (1) Greater is the nuclear charge, greater is the electron affinity
(2) Nitrogen has zero electron affinity
(3) Chlorine has highest electron affinity
(4) None of these
- 29.** The froth-floatation process is based upon
- (1) Magnetic properties of gangue
(2) Specific gravity of ore particles
(3) Preferential wetting of ore particles by oil
(4) None of these
- 30.** The temperature of an ideal gas can be increased by
- (1) Decreasing the pressure, but keeping the volume and amount fixed
(2) Decreasing the volume and pressure, but keeping the amount fixed
(3) Decreasing the quantity but keeping the pressure and volume fixed
(4) None of these

BIOLOGY

- 31.** When two pairs of genes interact to give 9:3:4 in F_2 generation they are
- (1) Complementary factor (2) Inhibitory factor
(3) Supplementary factor (4) None of these
- 32.** Which of the following is a free living nitrogen fixing bacteria present in soil?
- (1) Azotobactor (2) Nitrosomonas
(3) Rhizobium (3) None of these
- 33.** Water cycle is made up of two overlapping cycles
- (1) Surface water and atmospheric cycles
(2) Oceanic and fresh water cycles
(3) Global and smaller cycles.
(4) None of these
- 34.** The structure presents between the cell walls of two adjacent plant cells is
- (1) Microsome (2) Middle lamella
(3) Lysosome (4) None of these

35. In a cross 45 tall and 14 dwarf plants were obtained
Genotype of parents was

- (1) $TT \times TT$ (2) $TT \times Tt$
(3) $Tt \times Tt$ (4) None of these

36. Binomial nomenclature means writing the name of plant in two words which designate.

- (1) Order and family (2) Family and genus
(3) Genus and species (4) None of these

37. Which of the following is called 'Blood fluke' of man?

- (1) Taenia (2) Paragonium
(3) Schistoma (4) None of these

38. The inflorescence in *Mimosa pudica* (touch me not plant) is



- (1) Umbel (2) Corymb
(3) Spike (4) None of these

39. Flower is a modified shoot because

- (1) In some flowers thalamus become elongated and shows distinct nodes and internodes
(2) Flowers aggregate to form inflorescence
(3) Epicalyx is present in some flowers
(4) None of these

40. In mitochondria, cristae act as sites for

- (1) Protein synthesis
(2) Phosphorylation of flavoproteins
(3) Oxidation reduction reaction
(4) None of these

41. The disease "die back of shoots" is caused due to the deficiency of the following microelements

- (1) Copper (2) Chlorine
(3) Manganese (4) None of these

42. Little leaf disease is due to the deficiency of

- (1) Nitrogen (2) Zinc
(3) Manganese (4) None of these

43. During respiration yeast converts glucose to

- (1) Ethanol and water (2) Ethanol and oxygen
(3) Ethanol and CO_2 (4) None of these

44. Richest source of B_{12}

- (1) Chocolate and green grains
(2) Rice and egg
(3) Goat liver and Spirulina
(4) None of these

45. The life span of WBC is approximately

- (1) Less than 10 days (2) Between 20-30 days
(3) Between 2-3 months
(4) None of these

46. A rise in blood cholesterol may lead to a deposition of cholesterol on the walls of blood vessels. This causes the arteries to lose their elasticity and get stiffened. This is called

- (1) Hypertension
(2) Hypotension
(3) Systolic pressure
(4) None of these

47. Unit of inheritance is called

- (1) Gene (2) Nucleus
(3) Cell (4) None of these

48. Who is known as father of microbiology?

- (1) Alexander Fleming
(2) Robert Hook
(3) Leeuwenhoek
(4) None of these

49. The plasma membrane is impermeable to all molecules except

- (1) Glucose
(2) ATP
(3) Urea
(4) None of these



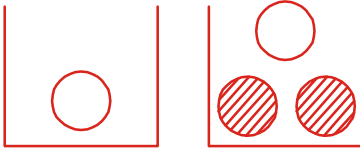

50. Which of the following organelle is called as the 'sorting centre' of the cell

- (1) RER
(2) SER
(3) GA
(4) None of these

MATHEMATICS

- 31.** Let $S_1 = \{1, 2, 3, \dots, 20\}$, $S_2 = \{a, b, c, d\}$, $S_3 = \{b, d, e, f\}$. Then number of elements of $(S_1 \times S_2) \cup (S_1 \times S_3)$ is
- (1) 100 (2) 120
(3) 140 (4) None of these
- 32.** Given two finite sets A and B such that $n(A) = 2$, $n(B) = 3$. Then total number of relations from A to B is
- (1) 4 (2) 8
(3) 64 (4) None of these
- 33.** The value of $\lim_{x \rightarrow 0} \frac{1}{x} \sin^{-1} \left(\frac{2x}{1+x^2} \right)$ is -
- (1) 2 (2) ∞
(3) Does not exist (4) None of these
- 34.** In the sequence 1, 2, 2, 3, 3, 3, 4, 4, 4, 4, ..., where n consecutive terms have the value n , the 150th term is
- (1) 17 (2) 16
(3) 18 (4) None of these
- 35.** If $A = \begin{bmatrix} 1 & -2 \\ 4 & 5 \end{bmatrix}$ and $f(t) = t^2 - 3t + 7$, then $f(A) + \begin{bmatrix} 3 & 6 \\ -12 & -9 \end{bmatrix}$ is equal to
- (1) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ (2) $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$
(3) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ (4) None of these
- 36.** If the position vectors of A, B and C are respectively $2\hat{i} - \hat{j} + \hat{k}$, $\hat{i} - 3\hat{j} - 5\hat{k}$ and $3\hat{i} - 4\hat{j} - 4\hat{k}$, then $\cos^2 A$ is equal to
- (1) 0 (2) $\frac{6}{41}$
(3) $\frac{35}{41}$ (4) None of these
- 37.** In a class of 55 students, the number of students studying different subjects are 23 in Mathematics, 24 in Physics, 19 in Chemistry, 12 in Mathematics and Physics, 9 in Mathematics and Chemistry, 7 in

Physics and Chemistry and 4 in all the three subjects. The number of students who have taken exactly one subject is

- (1) 6 (2) 9
(3) 7 (4) All of these
- 38.** When two dice are thrown, the probability that the difference of the numbers on the dice is 2 or 3 is
- (1) $\frac{7}{18}$
(2) $\frac{3}{11}$
(3) $\frac{5}{18}$
(4) None of these
- 39.** The different possibilities of distribution of 2 black and 2 white balls in two containers are as shown below. Which of the following statements is true.
- (i) 
- (ii) 
- (iii) 
- (iv) 
- (1) (ii) has the maximum possibility of picking a black ball
(2) (i) and (iv) has equal probabilities of picking a white ball.
(3) (iii) has the maximum possibility of picking a white ball.
(4) (iii) None of these

40. Solve
$$\begin{vmatrix} a+x & a-x & a-x \\ a-x & a+x & a-x \\ a-x & a-x & a+x \end{vmatrix} = 0$$

- (1) $x = 1, -9$ (2) $x = 1, 4a$
 (3) $x = 0, 3a$ (4) None of these

41. If the coefficient of the middle term in the expansion of $(1+x)^{2x+2}$ is a and the coefficients of middle terms in the expansion of $(1+x)^{2x+1}$ are b and c , then

- (1) $a + b = c$ (2) $a + c = b$
 (3) $b + c = a$ (4) None of these

42. If in triangle ABC, the altitudes from the vertices A, B, C on opposite sides are in H.P., then $\sin A, \sin B, \sin C$ are in

- (1) G.P
 (2) A.P.
 (3) Arithmetic Geometric Progression
 (4) None of these

43. A person standing on the bank of a river observes that the angle of elevation of the top of a tree on the opposite bank of a river is 60° and when he retires 40 m away from the tree, the angle of elevation becomes 30° . The breadth of the river is

- (1) 20 m
 (2) 30 m
 (3) 40 m
 (4) None of these

44. In the first four papers each of 100 marks, Rishi got 95, 72, 83 marks. If he wants an average of greater than or equal to 75 marks and less than 80 marks, find the range of marks he should score in the fifth paper.

- (1) $73 < x < 100$ (2) $52 < x < 77$
 (3) $75 < x < 80$ (4) None of these

45. When tested, the lives (in hours) of 5 bulbs were noted as follows:

1357, 1090, 1666, 1494, 1623

The mean deviations (in hours) from their mean is

- (1) 178 (2) 179
 (3) 220 (4) None of these

46. The value of $\int_{-2}^2 (ax^3 + bx + c)$ depends on the

- (1) value of b (2) value of c
 (3) value of a (4) None of these

47. The differential equation $y \frac{dy}{dx} + x = c$ represents

- (1) A family of hyperbolas
 (2) A family of circles whose centres are on the y -axis
 (3) A family of circles whose centres are on the x -axis.
 (4) None of these

48. The projection of $\vec{a} = 3\hat{i} - \hat{j} + 5\hat{k}$ on $\vec{b} = 2\hat{i} + 3\hat{j} + \hat{k}$ is

- (1) $\frac{8}{\sqrt{35}}$ (2) $\frac{8}{\sqrt{39}}$
 (3) $\frac{8}{\sqrt{14}}$ (4) None of these

49. The angle of elevation of the top of a TV tower from three points A, B and C in a straight line through the foot of the tower are $\alpha, 2\alpha$ and 3α respectively. If $AB = a$, then height of the tower is

- (1) $a \tan \alpha$ (2) $a \sin \alpha$
 (3) $a \sin 2\alpha$ (4) None of these

50. The radius of the circle passing through the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$ and having its centre at $(0, 3)$ is

- (1) 4 (2) 3
 (3) $\sqrt{12}$ (4) None of these



END OF THE EXAM