

# BEST 2024



## BOTHRA ENTRANCE AND SCHOLARSHIP TEST

### Class X Studying Moving to Class XI

### Physics, Chemistry Mathematics & Biology

#### INSTRUCTIONS FOR CANDIDATE

1. The Answer Sheet is provided to you separately which is a machine readable Optical Mark Recognition (OMR). You have to mark your answers in the **OMR** by darkening bubble, as per your answer choice, by using black & blue ball point pen.
2. Total Questions to be Attempted 40. (Mathematics-20), (Physics-8), (Chemistry-6), (Biology-6).
3. Marking Scheme:
  - a. If darkened bubble is RIGHT answer: 4 Marks.
  - b. If no bubble is darkened in any question: No Mark.
  - c. If darkened bubble is WRONG answer: -1 Mark (Minus One Mark).
4. Think wisely before darkening bubble as there is negative marking for wrong answer.
5. If you are found involved in cheating or disturbing others then your OMR will be cancelled.
6. Do not put any stain on **OMR** and hand it over back properly to the invigilator.



**Bothra**  
CLASSES

## MATHEMATICS

(Single correct option +4, -1)

- The least number which when divided by 15, leaves a remainder of 5, when divided by 25, leaves a remainder of 15 and when divided by 35, leaves a remainder of 25, is  
(a) 515 (b) 525 (c) 1040 (d) 1050
- The product of unit digit in  $(7^{95} - 3^{58})$  and  $(7^{95} + 3^{58})$  is  
(a) 8 (b) lies between 3 and 7  
(c) 6 (d) lies between 3 and 6
- The zeroes of the quadratic polynomial  $x^2 + 99x + 127$  are  
(a) both positive (b) both negative  
(c) one positive and one negative (d) both equal
- Let  $P(x)$  be a polynomial of degree 3 and  $P(n) = \frac{1}{2}$  for  $n = 1, 2, 3, 4$ . Then the value of  $P(5)$  is  
(a) 0 (b)  $\frac{1}{5}$  (c)  $-\frac{2}{5}$  (d)  $\frac{3}{5}$
- In a number of two digits, unit's digit is twice the tens digit. If 36 be added to the number, the digits are reversed. The number is  
(a) 36 (b) 63 (c) 48 (d) 84
- The value of  $c$  for which the pair of equations  $cx - y = 2$  and  $6x + 2y = 3$  will have infinitely many solutions is  
(a) 3 (b) -3 (c) -12 (d) no value
- If the roots of  $5x^2 - kx + 1 = 0$  are real and distinct, then  
(a)  $-2\sqrt{5} < k < 2\sqrt{5}$  (b)  $k > 2\sqrt{5}$  only  
(c)  $k > -2\sqrt{5}$  only (d) either  $k > 2\sqrt{5}$  or  $k < -2\sqrt{5}$
- If  $x = \sqrt{7 + 4\sqrt{3}}$ , then  $x + \frac{1}{x} =$   
(a) 4 (b) 6 (c) 3 (d) 2
- In an A.P. if  $a = 5$ ,  $a_n = 81$  and  $S_n = 860$ , then  $n$  is  
(a) 10 (b) 15 (c) 20 (d) 25
- If  $\frac{b+c-a}{a}$ ,  $\frac{c+a-b}{b}$ ,  $\frac{a+b-c}{c}$  are in A.P. then which of the following is in A.P.?

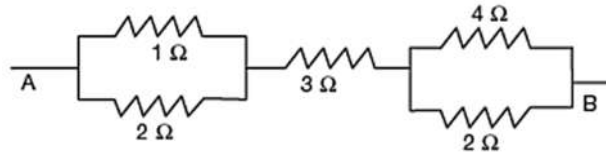
- (a)  $a, b, c$                       (b)  $a^2, b^2, c^2$                       (c)  $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$                       (d)  $a^3, b^3, c^3$
11. If  $n^{\text{th}}$  term of an AP is given by  $a_n = 2n + 3$  then common difference of an AP is  
 (a) 2                      (b) 3                      (c) 5                      (d) 1
12. If  $\Delta ABC \sim \Delta DEF$  such that  $BC = 2.1\text{cm}$  and  $EF = 2.8\text{ cm}$ . If the area of triangle DEF is  $16\text{ cm}^2$ , then the area of triangle ABC (in sq.cm) is  
 (a) 9                      (b) 12                      (c) 8                      (d) 13
13. The perimeters of two similar triangles ABC and PQR are respectively 36 cm and 24 cm. If  $PQ = 10\text{ cm}$ , then  $AB =$   
 (a) 10 cm                      (b) 20 cm                      (c) 25 cm                      (d) 15 cm
14. Let D be a point on the side BC of a triangle ABC such that  $\angle ADC = \angle BAC$ . If  $AC = 21\text{ cm}$ , then the side of an equilateral triangle whose area is equal to the area of the rectangle with sides BC and DC is  
 (a)  $14 \times 3^{1/2}$                       (b)  $42 \times 3^{-1/2}$                       (c)  $14 \times 3^{3/4}$                       (d)  $42 \times 3^{1/2}$
15. The perimeter of a triangle with vertices  $(0, 4)$ ,  $(0, 0)$  and  $(3, 0)$  is  
 (a) 5                      (b) 12                      (c) 11                      (d)  $7 + \sqrt{5}$
16. If the point P  $(p, q)$  is equidistant from the points  $A(a+b, b-a)$  and  $B(a-b, a+b)$ , then  
 (a)  $ap = bq$                       (b)  $bp = aq$                       (c)  $ap + bq = 0$                       (d)  $bp + aq = 0$
17. A circle passes through the vertices of a triangle ABC. If the vertices are  $A(-2, 5)$ ,  $B(-2, -3)$ ,  $C(2, -3)$ , then the centre of the circle is  
 (a)  $(0, 0)$                       (b)  $(0, 1)$                       (c)  $(-2, 1)$                       (d)  $(0, -3)$
18. If  $p \sin \theta + q \cos \theta = a$  and  $p \cos \theta - q \sin \theta = b$ , then  $\frac{p+a}{q+b} + \frac{q-b}{p-a} =$   
 (a) 1                      (b)  $a^2 + b^2$   
 (c) 0                      (d) 2
19. If  $\operatorname{cosec} x - \cot x = \frac{1}{3}$ , where  $x \neq 0$ , then the value of  $\cos^2 x - \sin^2 x$  is  
 (a)  $\frac{16}{25}$                       (b)  $\frac{9}{25}$                       (c)  $\frac{8}{25}$                       (d)  $\frac{7}{25}$

20.  $\sin 2A = 2 \sin A$  is true when  $A =$   
 (a)  $0^\circ$  (b)  $30^\circ$  (c)  $45^\circ$  (d)  $60^\circ$

**PHYSICS**

(Single correct option +4, -1)

1. Study the circuit given below and determine the effective resistance (in  $\Omega$ ) between A and B.



- (a) 5 (b) 10 (c) 15 (d) 20
2. It takes 5 minute to boil water in an electric kettle. If the length of the coil in the kettle is changed to half of its original length, then what will be the time taken to boil the same amount of water, with the same power supply?  
 (a) 2.5 min. (b) 5 min. (c) 10 min. (d) 20 min.
3. Which of the following is not due to total internal reflection?  
 (a) Brilliance of diamond  
 (b) Mirage on hot summer days  
 (c) Working of optical fibre  
 (d) Difference between apparent and real depth of pond.
4. An air bubble in a glass slab ( $\mu = 3/2$ ) is 6 cm deep when viewed from one face and 3 cm deep when viewed from the opposite face. Determine the thickness of the slab?  
 (a) 9 cm (b) 13.5 cm (c) 15 cm (d) 18 cm
5. If a light ray is incident normally onto the surface of a glass slab, then the ray \_\_\_\_\_.  
 (a) emerges without any deviation  
 (b) bends towards the normal  
 (c) bends away from the normal  
 (d) undergoes total internal reflection
6. **Assertion** : Sky appears in blue colour.  
**Reason** : Blue colour in sunlight travelling through atmosphere undergoes maximum scattering.  
 (a) A and R are true and R is the correct explanation of A.  
 (b) A and R are true, but R is not the correct explanation of A.  
 (c) A is true but R is false.  
 (d) Both A and R are false.

7. A tree of height 10 m is viewed by a diver under water at a certain distance from the surface. Determine the apparent height  $\left[ \mu_w = \frac{4}{3} \right]$  of the tree.
- (a) 20 m                      (b) 6.66 m                      (c)  $\frac{40}{3}$  m                      (d) 25 m
8. A bulb is rated 60 W – 230 V. How much will be the current (in A) flowing through it, when connected to 115 V?
- (a) 0.5                      (b) 0.23                      (c) 0.023                      (d) 0.13

## CHEMISTRY

(Single correct option +4, -1)

1. A researcher adds barium hydroxide to hydrochloric acid to form a white-coloured barium chloride. Which of the following option gives the balanced chemical equation of the reaction?
- (a)  $\text{HCl} + \text{Ba}(\text{OH})_2 \rightarrow \text{BaCl}_2 + 2\text{HOH}$                       (b)  $2\text{HCl} + \text{Ba}(\text{OH})_2 \rightarrow \text{BaCl}_2 + 2\text{HOH}$   
(c)  $2\text{HCl} + \text{Ba}(\text{OH})_2 \rightarrow \text{BaH}_2 + 2\text{HCl} + \text{O}_2$                       (d)  $\text{HCl} + 2\text{Ba}(\text{OH}) \rightarrow 2\text{BaCl}_2 + 2\text{HOH} + \text{O}_2$
2. A student wrote a chemical equation of the reaction between carbon monoxide and hydrogen as,  
 $\text{CO}_2 + 2\text{H}_2 \rightarrow \text{CH}_3\text{OH}$ .  
How can the reaction be classified?
- (a) The reaction is an example of a combination reaction as a compound separates into two compounds.  
(b) The reaction is an example of a decomposition reaction as a compound dissociates into two compounds.  
(c) The reaction is an example of a combination reaction as two compounds react to form a single compound.  
(d) The reaction is an example of a decomposition reaction as two compounds react to form a single compound.
3. An aqueous solution turns the red litmus solution blue. Excess addition of which of the following solutions would reverse the change?
- (a) Baking powder  
(b) Lime  
(c) Ammonium hydroxide solution  
(d) Hydrochloric acid

4. **What happens when a solution of an acid is mixed with a solution of a base in a test tube?**  
(i) The temperature of the solution increases  
(ii) The temperature of the solution decreases  
(iii) The temperature of the solution remains the same  
(iv) Salt formation takes place  
(a) (i) only  
(b) (i) and (iii)  
(c) (ii) and (iii)  
(d) (i) and (iv)
5. **The chemical reaction between a piece of copper and nitric acid is given by the chemical equations,**  
$$\text{Cu} + \text{HNO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + \text{H}_2$$
$$\text{H}_2 + \text{HNO}_3 \rightarrow \text{H}_2\text{O} + \text{NO}_2$$
**What can be inferred from the chemical equation?**  
(a) Copper causes the oxidation of  $\text{HNO}_3$  to form  $\text{NO}_2$   
(b) Hydrogen gas gets oxidised by  $\text{HNO}_3$  to form water  
(c) Gas reacts with oxygen in the air to form water  
(d) Every Nitrate reacts with hydrogen to form  $\text{NO}_2$  and  $\text{H}_2\text{O}$
6. **Which of the following can undergo a chemical reaction?**  
(a)  $\text{MgSO}_4 + \text{Fe}$   
(b)  $\text{ZnSO}_4 + \text{Fe}$   
(c)  $\text{MgSO}_4 + \text{Pb}$   
(d)  $\text{CuSO}_4 + \text{Fe}$

## **BIOLOGY**

**(Single correct option +4, -1)**

- 1) Which of the following statement is incorrect?  
(a) Exchange of gases occurs across the surface of stems, roots and leaves as well.  
(b) Large amounts of water can also be lost through these stomata, the plant closes these pores when it does need carbon dioxide for photosynthesis.  
(c) The opening and closing of the pore is a function of the guard cells.  
(d) The guard cells swell when water flows into them, causing the stomatal pore to open. Similarly the pore closes if the guard cells shrink.

- 2) How many statements are incorrect?
- (1) The small intestine is the site of the incomplete digestion of carbohydrates, proteins and fats.
  - (2) It receives the secretions of the liver and pancreas for this purpose.
  - (3) The food coming from the stomach is acidic and has to be made acidic for the pancreatic enzymes to act.
  - (4) Bile juice from the liver accomplishes this in addition to acting on fats.
  - (5) Fats are present in the intestine in the form of large globules which makes it difficult for enzymes to act on them.
- (a) One                      (b) two                      (c) three                      (d) four
- 3) The breakdown of pyruvate to give carbon dioxide, water and energy takes place in
- (a) Cytoplasm.              (b) Mitochondria.              (c) Chloroplast.              (d) Nucleus.
- 4) The brain is responsible for
- (a) Thinking.    (b) Regulating the heart beat.
- (c) Balancing the body.    (d) all of the above
- 5) **Statement –I:** The pollen needs to be transferred from the stamen to the stigma. If this transfer of pollen occurs in the same flower, it is referred to as self-pollination. On the other hand, if the pollen is transferred from one flower to another, it is known as crosspollination.
- Statement –II:** This transfer of pollen from one flower to another is achieved by agents like wind, water or animals.
- After the pollen lands on a suitable stigma, it has to reach the female germ-cells which are in the ovary. For this, a tube grows out of the pollen grain and travels through the style to reach the ovary.
- (a) Statement-I and II both are correct                      (b) only statement-II are correct
- (c) Only statement-I are correct                      (d) none of these
- 6) How many statements are correct?
- (1) The formation of germ-cells or sperms takes place in the testes.
  - (2) These are located outside the abdominal cavity in scrotum because sperm formation requires a lower temperature than the normal body temperature.
  - (3) The role of the testes in the secretion of the hormone, testosterone
  - (4) In addition to regulating the formation of sperms, testosterone brings about changes in appearance seen in boys at the time of adulthood.
- (a) (1), (2), (3) are correct                      (b) (1), (2), (3) and (4) are correct
- (c) Only (1) and (2) are correct                      (d) none of these