

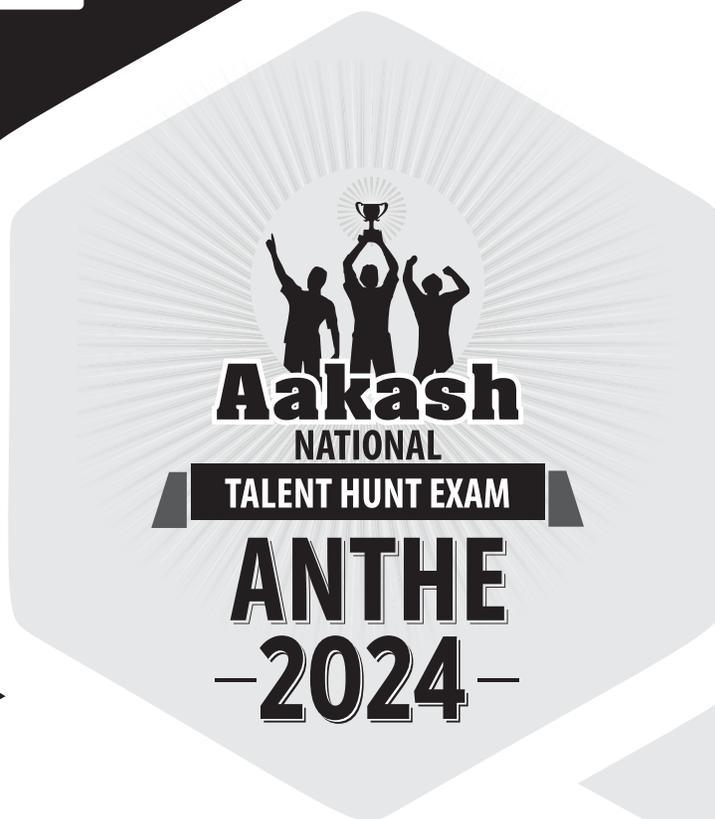
Sample Paper

ENGINEERING



Aakash

Medical | IIT-JEE | Foundations



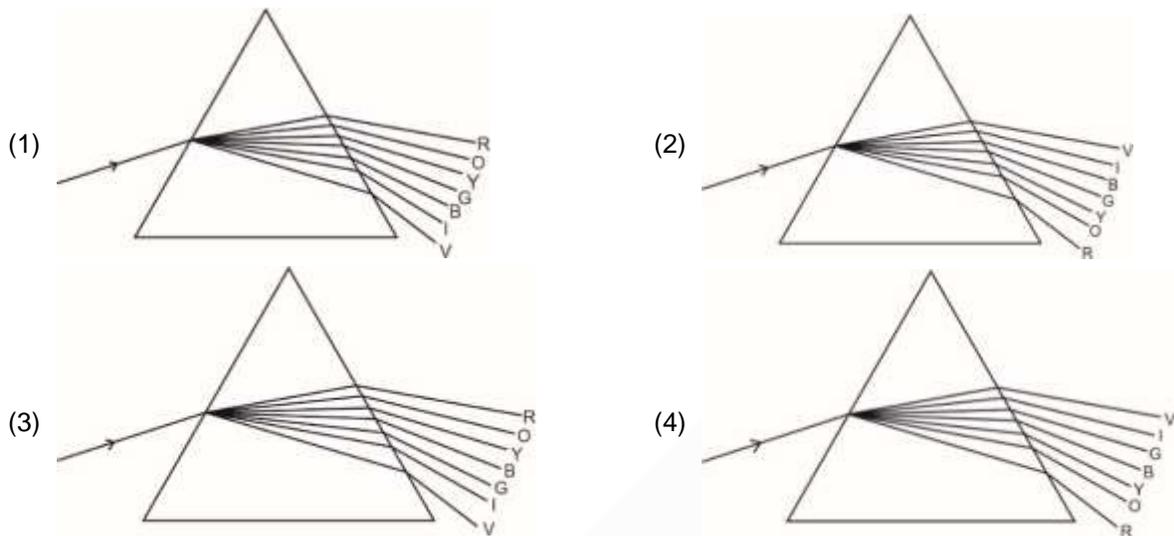
(Class X Studying Moving to Class XI)

Physics, Chemistry, Mathematics & Mental Ability

INSTRUCTIONS FOR CANDIDATE

1. Duration of Test is 1 hr.
2. The Test Booklet consists of **40** questions. The maximum marks are **90**. There is **no negative marking** for wrong answer.
3. Pattern of the questions are as under:
 - (i) The question paper consists of four parts *i.e.*, **Physics, Chemistry, Mathematics** and **Mental Ability**. Each part has **two sections**.
 - (ii) **Section-I:** This section contains **35** multiple choice questions, which have **only one** correct answer. Each question carries **+2 marks** for correct answer.
 - (iii) **Section-II:** This section contains **5** multiple choice questions, in which **one or more than one** choice(s) is(are) correct. Each question carries **+4 marks** for correct answer.

5. Which of the following figures is correctly show the dispersion of white light by a glass prism?



6. Which of the following is caused due to scattering of light?

- (1) Formation of rainbow in the sky
- (2) The sky appears blue
- (3) Splitting of white light into its component colours
- (4) Both (1) and (3)

7. An object is placed at a distance of 60 cm from a concave lens of power 2.5 D. The magnification of the image formed is

- (1) 0.2
- (2) 0.4
- (3) 0.6
- (4) 0.8

8. Which of the following statements is correct?

- (1) The speed of light is slowest in vacuum
- (2) Convex mirrors are commonly used in torches
- (3) According to laws of refraction of light, angle of incidence is always equal to angle of refraction
- (4) For a real object placed at the infinity in front of a concave lens, the image formed is virtual and erect

9. A point object is placed in front of a concave lens of focal length f . If the image is formed at a distance of $\frac{f}{3}$ from the optical centre of the lens, then the object distance from the lens is

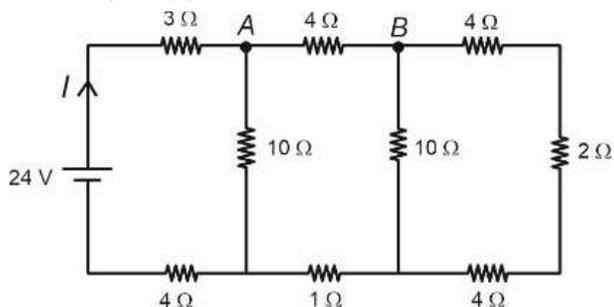
- | | |
|--------------------|--------------------|
| (1) $\frac{3f}{2}$ | (2) $2f$ |
| (3) $\frac{f}{2}$ | (4) $\frac{2f}{3}$ |

SECTION-II

ONE OR MORE THAN ONE CORRECT ANSWER TYPE

This section contains 1 multiple choice question, which has 4 choices (1), (2), (3) and (4) out of which **ONE OR MORE THAN ONE** choice(s) is(are) correct.

10. An electric circuit of nine resistors connected with a 24 V battery is shown in the figure. Analyze the circuit diagram and choose the correct option(s).



- (1) Current I in the circuit is 8 A
- (2) Current I in the circuit is 2 A
- (3) The heat dissipated in the circuit in 2 min is 50 kJ
- (4) The heat dissipated in the circuit in 2 min is 5.76 kJ

CHEMISTRY

SECTION-I

SINGLE CORRECT ANSWER TYPE

This section contains 9 multiple choice questions. Each question has 4 choices (1), (2), (3) and (4) out of which **ONLY ONE** choice is correct.

11. Which of the following gases is usually flushed in the packets of chips to prevent them from getting oxidised?
 - (1) Oxygen
 - (2) Chlorine
 - (3) Nitrogen
 - (4) Hydrogen
12. Which of the following statements is incorrect?
 - (1) Precipitate may or may not be formed in double displacement reaction
 - (2) The decomposition of limestone takes place in the presence of sunlight only
 - (3) Zinc and lead are more reactive than copper
 - (4) When fats and oils are oxidised, their smell and taste change
13. Nikhil took about 2 g of barium hydroxide in a beaker and mixed 1 g of ammonium chloride into it. As the mixture is stirred, the solids begin to react with each other. Based upon this activity, identify the incorrect statement.
 - (1) Liquid water and gaseous ammonia are formed in the reaction
 - (2) The bottom of the beaker feels cold when touched with palm
 - (3) The given reaction is an example of endothermic reaction
 - (4) The thermal decomposition of barium hydroxide takes place when ammonium chloride is introduced in beaker

14. When gypsum is heated at 373 K it gives a compound 'X'. On exposure to moist air 'X' gives compound 'Y'. Identify 'X' and 'Y' and choose the correct option.
- (1) $X = \text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$
 $Y = \text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
- (2) $X = \text{CaSO}_4 \cdot 1\frac{1}{2}\text{H}_2\text{O}$
 $Y = \text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$
- (3) $X = \text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$
 $Y = \text{CaOCl}_2$
- (4) $X = \text{Ca(OH)}_2$
 $Y = \text{CaCO}_3$
15. All of the following are the examples of olfactory indicators, **except**
- (1) Clove oil (2) Onion juice
 (3) Vanilla (4) Red cabbage leaves
16. An element with atomic number 20 combines with another element having atomic number 8 to form a compound 'X'. Which of the following is incorrect about 'X'?
- (1) It is a solid and brittle (2) It has high melting point
 (3) It does not conduct electricity in molten state (4) It is an ionic compound
17. Which of the following statements is/are true?
- (a) Mercury exists as solid at room temperature.
 (b) Metals like gallium and caesium have very high melting points.
 (c) Iodine is a lustrous non-metal.
 (d) Lithium and potassium have low densities and low melting points.
- (1) Only (b) (2) Only (b) and (c)
 (3) Only (c) and (d) (4) (a), (b) and (c)
18. The best conductor and poor conductor of heat respectively are
- (1) Mercury and copper (2) Mercury and lead
 (3) Silver and copper (4) Silver and lead
19. Which of the following acids is present in sour milk (curd)?
- (1) Acetic acid (2) Citric acid
 (3) Oxalic acid (4) Lactic acid

SECTION-II

ONE OR MORE THAN ONE CORRECT ANSWER TYPE

This section contains 1 multiple choice question, which has 4 choices (1), (2), (3) and (4) out of which **ONE OR MORE THAN ONE** choice(s) is(are) correct.

20. A salt 'X' is used as an antacid. On heating 'X', it gives another salt 'Y' and a gas 'Z'. Salt 'Y' is used in the manufacture of borax. Identify 'X', 'Y' and 'Z' and choose the correct option(s).
- (1) Salt 'X' is NaHCO_3 and it is used in bakery products
 (2) Salt 'Y' is sodium carbonate and its crystals are used for removing permanent hardness of water
 (3) Crystalline form of 'Y' contains 10 water molecules as water of crystallisation
 (4) Gas 'Z' is also evolved when 'Y' reacts with hydrochloric acid and it turns lime water milky

MATHEMATICS**SECTION-I****SINGLE CORRECT ANSWER TYPE**

This section contains 10 multiple choice questions. Each question has 4 choices (1), (2), (3) and (4) out of which **ONLY ONE** choice is correct.

21. The distance between two poles of height 16 m and 9 m is x metres. If angles of elevation of their tops from the bottom of the other are 30° and 60° , then the value of x in metres is
- (1) 9 (2) 12
(3) 16 (4) 15
22. $\frac{\sin\theta - 2\sin^3\theta}{(2\cos^2\theta - 1)\cos\theta}$ equals
- (1) $\sin\theta$ (2) $\frac{\sin\theta}{\cos\theta}$
(3) $\frac{\sec\theta}{\cos\theta}$ (4) $\cot\theta$
23. The distance between the points $P(-1, -1)$ and $Q(-4, 4)$ is
- (1) $2\sqrt{17}$ units (2) $\sqrt{34}$ units
(3) $\sqrt{78}$ units (4) $\sqrt{17}$ units
24. If in $\triangle XYZ$ and $\triangle PQR$, $\frac{XY}{PQ} = \frac{XZ}{PR}$, then they will always be similar, when
- (1) $\angle X = \angle P$ (2) $\angle X = \angle Z$
(3) $\angle Y = \angle R$ (4) $\angle Z = \angle Q$
25. How many terms of the A.P. : 44, 41, 38, must be taken so that their sum is 338?
- (1) 15 (2) 13
(3) 12 (4) 14
26. A train and a car, travelling at a uniform speed for 340 km, would have taken 15 minutes less and 18.75 minutes less respectively if their respective speeds were 5 km/hr more and 4 km/hr more. The average of their original speeds is
- (1) 65 km/hr
(2) 72 km/hr
(3) 70 km/hr
(4) 80 km/hr

27. Discriminant of the quadratic equation $3x^2 + 4x + 5 = 0$ is
- (1) -44 (2) -46
 (3) -22 (4) 44
28. If $2x + 3y = 8$ and $4x + 6y = 7$, then the pair of equations has
- (1) No solution (2) Infinitely many solutions
 (3) Unique solution (4) Two solutions
29. Zeroes of polynomial $p(x) = 3(2ax^2 - b)$, where $a \neq 0$, is
- (1) $\pm\sqrt{\frac{b}{2a}}$ (2) $\pm\frac{2b}{a}$
 (3) $\pm\frac{b}{6a}$ (4) $\pm\sqrt{\frac{b}{a}}$
30. If the HCF (546, 963) is 3, then the LCM (546, 963) is
- (1) 75114 (2) 175266
 (3) 40446 (4) 262899

SECTION-II

ONE OR MORE THAN ONE CORRECT ANSWER TYPE

This section contains 2 multiple choice questions. Each question has 4 choices (1), (2), (3) and (4) out of which **ONE OR MORE THAN ONE** choice(s) is(are) correct.

31. If a point $P\left(\frac{m+n}{m-n}, \frac{m-n}{m+n}\right)$ divides the line segment joining the points $R(-1, 2)$ and $S\left(2, \frac{1}{2}\right)$ in the ratio $a_1 : a_2$, then the correct option(s) is/are

$$\left[\text{where } m = \left(\frac{1 - \sin \alpha}{\cos \alpha} + \frac{\cos \alpha}{1 + \sin \alpha} \right) \left(\sec \alpha + \frac{1}{\cot \alpha} \right) \quad n = \frac{\cot \alpha + \operatorname{cosec} \alpha - 1}{\cot \alpha - \operatorname{cosec} \alpha + 1} - \frac{1 + \cos \alpha}{\sin \alpha} \right]$$

- (1) Coordinates of P are $(1, 1)$ (2) $\frac{a_1^2 + a_2^2}{a_1^2 - a_2^2} = \frac{5}{3}$
 (3) $(m+n)^2 = 9$ (4) $m \cdot n = \frac{1 - \sin \alpha}{\sin \alpha \cos \alpha}$
32. If the sum of first n terms of an AP is given by $3n^2 - 2n$ and n^{th} term is given by t_n , then choose the correct option(s).
- (1) $t_1 + t_2 + t_3 + t_4 + t_5 = 65$ (2) $S_{n+4} - S_{n+3} = 6n + 19$
 (3) $11t_5 = 5t_{10}$ (4) $\frac{S_{n-2}}{S_{n+2}} = \frac{3n^2 + 12n + 10}{3n^2 - 12n + 10}$

MENTAL ABILITY

SECTION-I

SINGLE CORRECT ANSWER TYPE

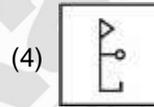
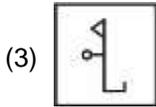
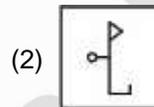
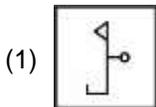
This section contains 7 multiple choice questions. Each question has 4 choices (1), (2), (3) and (4) out of which **ONLY ONE** choice is correct.

33. Which two signs and numbers on left hand side needs to be interchanged to make the equation correct?

$$50 \div 3 + 16 - 34 \times 2 = 158$$

- (1) \div and \times , 4 and 2
- (2) \div and \times , 2 and 1
- (3) $+$ and $-$, 5 and 6
- (4) $-$ and $+$, 1 and 6

34. The figures on either side of ':' follows a certain relationship. Bearing the same relationship, choose the correct option which can replace the question mark.



35. Jitendra starts to move towards east and walks 100 m. Now, he moves 120 m towards south. After that, he moves 60 m in east. Further, he moves 50 m north, 49 m east and 50 m south respectively and stops. The minimum distance between initial and final point is

- (1) 225 m
- (2) 250 m
- (3) 241 m
- (4) 210 m

36. If in a certain code language, 'PLEASANT' is coded as '128' and 'ROTTEN' is coded as '70', then how will 'CALCULATOR' be coded in the same code language?

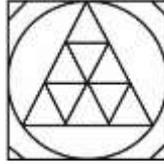
- (1) 160
- (2) 164
- (3) 172
- (4) 176

37. Read the given information carefully and answer the following question.

P, Q, R, S and T are travelling in a car to reach at different places like Agra, Mathura, Noida, Ghaziabad and Kanpur but not necessarily in the same order. P wants to go to Agra whereas S goes to Kanpur. Q doesn't go to Mathura and Noida. T doesn't go to Noida. Where does R go?

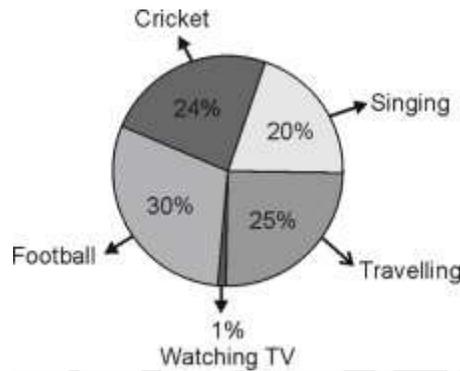
- (1) Noida
- (2) Mathura
- (3) Ghaziabad
- (4) Kanpur

38. The total number of triangles in the following figure is



- (1) 17
- (2) 15
- (3) 16
- (4) 14

39. A pie chart is given as follows:



Distribution of activities performed by a person in percentage

The central angle formed by the activities (singing, travelling and watching TV) altogether is

- (1) 160°
- (2) 165.6°
- (3) 170°
- (4) 180°

SECTION-II

ONE OR MORE THAN ONE CORRECT ANSWER TYPE

This section contains 1 multiple choice question, which has 4 choices (1), (2), (3) and (4) out of which **ONE OR MORE THAN ONE** choice(s) is(are) correct.

40. Which of the following pair(s) follow(s) the same pattern?

$$472 : 351 :: 987 : 570 :: 879 : 432$$

- (1) 643 : 79
- (2) 829 : 97
- (3) 347 : 118
- (4) 889 : 601



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