



# ADMISSION CUM SCHOLARSHIP TEST SAMPLE TEST PAPER

(For Students Going to Class 11<sup>TH</sup> IN 2024)

**STREAM : ENGINEERING | COURSE OFFERED : GROUND ZERO**

Time : 2 hours

Maximum Marks: 240

## INSTRUCTIONS

**(A) General :**

1. This Question paper contains **FOUR** Parts (Physics, Chemistry, Mathematics & Mental Ability) containing 60 questions in all.
2. This Question Paper contains 12 pages, other than the OMR.
3. This Question Paper contains total **60 questions, 15 questions each in Physics, Chemistry, Mathematics & Mental Ability.**
4. The Question Paper has blank spaces at the bottom of each page for rough work.No additional sheets will be provided for rough work.
5. Blank papers, clip boards, log tables, slide rule, calculators, cellular phones, pagers and electronic gadgets, in any form, are **NOT** allowed.
6. This booklet also contains the **OMR** answer sheet (i.e., A machine gradable Response Sheet).

**(B) Answering on the OMR:**

7. Each question will have **4 choices** in both the Sections, out of which **only one choice is correct.**
8. Darken the bubble with **Ball Pen (Blue or Black) ONLY.**

**(C) Filling – in Name and Registration No.**

8. On the **OMR sheet**, write your Name and Registration No. in ink. Also, put your signature in the appropriate box in ink.

**(D) Marking Scheme:**

9. (a) For each question, you will be awarded **4 marks** if you have darkened only one bubble corresponding to the right answer.
- (b) In case you have not darkened any bubble, you will be awarded 0 mark for that question.
- (c) In all other cases, you will be awarded **-1 mark.**

Name : .....

Registration No.:

DO NOT BREAK THE SEALS ON THIS BOOKLET, AWAIT INSTRUCTIONS FROM THE INVIGILATOR.

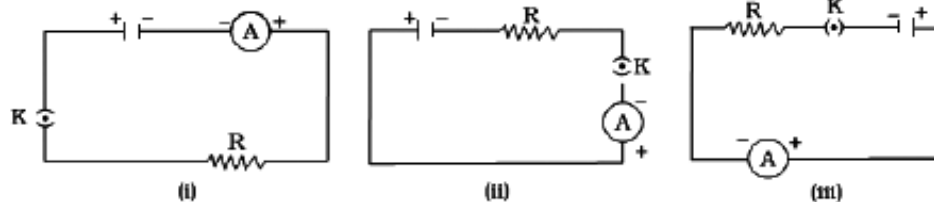
SEAL

**PART-A : PHYSICS**

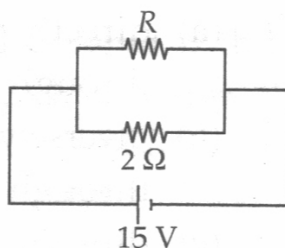
- The number of images formed by two plane mirrors inclined at an angle  $60^\circ$  of an object placed symmetrically between mirrors is  
(A) 5 (B) infinite (C) 6 (D) 7
- A convex mirror has a focal length 15 cm. A real object placed at a distance 15 cm in front of it from the pole, produces an image at  
(A) 7.5 cm (B) 30 cm (C) infinity (D) 15 cm
- A real image of half the size is obtained in a concave spherical mirror with a radius of curvature of 40 cm. The distance of the object and that of its image will be  
(A) 15 cm, 30 cm (B) 30 cm, 15 cm (C) 30 cm, 60 cm (D) 60 cm, 30 cm
- Two vertical plane mirrors are inclined at an angle of  $60^\circ$ ; with each other. A ray of light travelling horizontally is reflected first from one mirror and then from the other mirror. Then the resultant deviation is  
(A)  $180^\circ$  (B)  $240^\circ$  (C)  $60^\circ$  (D)  $120^\circ$
- Distance between an object and the screen is  $D$ . Real images of an object are formed on the screen for two positions of a lens separated by a distance  $d$ . The ratio between the sizes of two images will be  
(A)  $D/d$  (B)  $D^2/d^2$   
(C)  $(D - d)^2/(D + d)^2$  (D)  $\sqrt{(D / d)}$
- The property of persistence of vision is used in  
(A) short sightedness (B) long sightedness  
(C) cinematography (D) colour vision
- Which of the following statements is correct about rainbow ?  
(A) In primary rainbow, red colour is on the outside and violet colour is on the inside.  
(B) In primary rainbow, violet colour is on the outside and red colour is on the inside.  
(C) Secondary rainbow is brighter than primary rainbow.  
(D) In secondary rainbow, light wave suffers one total internal reflection before coming out.

Space for rough work

8. A cell, a resistor, a key and ammeter are arranged as shown in the circuit diagrams of Figure. The current recorded in the ammeter will be



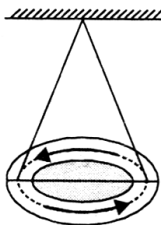
- (A) maximum in (i) (B) maximum in (ii)  
 (C) maximum in (iii) (D) the same in all the cases
9. What is the maximum resistance which can be made using five resistors each of  $1/5 \Omega$  ?  
 (A)  $1/5 \Omega$  (B)  $10 \Omega$  (C)  $5 \Omega$  (D)  $1 \Omega$
10. If in the circuit, power dissipation is  $150 \text{ W}$ , then R is



- (A)  $2 \Omega$  (B)  $6 \Omega$  (C)  $5 \Omega$  (D)  $4 \Omega$
11. 1 horse power is equal to  
 (A)  $700 \text{ W}$  (B)  $726 \text{ W}$  (C)  $736 \text{ W}$  (D)  $746 \text{ W}$
12. If n equal resistances are first connected in series and then connected in parallel, the ratio of the maximum to the minimum resistance is  
 (A) n (B)  $\frac{1}{n^2}$  (C)  $n^2$  (D)  $\frac{1}{n}$

Space for rough work

13. A circular loop is suspended in air as shown in figure. When the loop is seen from above, current flows anti-clockwise and when seen from below, current flows clockwise. This loop behaves as a magnet. The N-pole of this magnet is on



- (A) the upper face (B) lower face  
(C) the lower face if current is large (D) upper face if current is large
14. SI unit of resistivity is  
(A) ohm-meter (B) ohm-meter<sup>2</sup> (C) ohm<sup>-1</sup> (D) ohm-meter<sup>-1</sup>
15. Which of the following is a better nuclear fuel?  
(A) Thorium - 236 (B) Uranium - 235  
(C) Neptunium - 239 (D) Plutonium - 239

## PART-B : CHEMISTRY

16.  $10^{-6}$  M HCl is diluted to 100 times. Its pH is  
(A) 6.0 (B) 8.0 (C) 6.95 (D) 9.5
17. Iron filings were added to solution of copper sulphate. After 10 minutes, it was observed that the blue colour of the solution changed and layer got deposited on iron filings. The colour of the solution and that of the layer would respectively be  
(A) Yellow and green (B) Brown and blue  
(C) Red and greenish blue (D) Green and reddish brown

Space for rough work

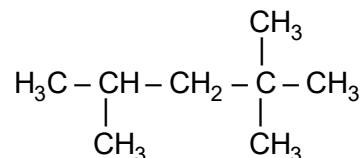
18. Write the net ionic equation for the reaction of sodium hydroxide with hydrochloric acid.

- (A)  $\text{Na}^+ + \text{Cl}^- \rightarrow \text{NaCl}$  (B)  $\text{Na}^+ + \text{Cl}^- + \text{H}^+ + \text{OH}^- \rightarrow \text{NaCl} + \text{H}_2\text{O}_{(l)}$   
 (C)  $\text{H}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O}_{(l)}$  (D) None of these

19. The hydrophilic part of a synthetic detergent is

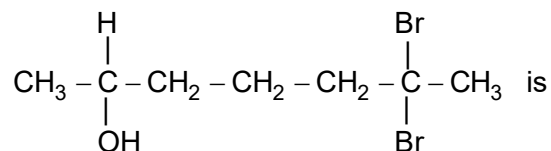
- (A)  $\text{CH}_3(\text{CH}_2)_{10}\text{-CH}_2\text{-}$  (B)  $\text{-CO}^-\text{Na}^+$   
 (C)  $\text{-SO}_3^-\text{Na}^+$  (D)  $\text{-COO}^-\text{Na}^+$

20. In the given structure, the type of carbon atoms present are



- (A) One primary, two secondary and one tertiary  
 (B) Four primary, one secondary and two tertiary  
 (C) One primary, one secondary, one tertiary and one quaternary  
 (D) Five primary, one secondary, one tertiary and one quaternary

21. The IUPAC name of



- (A) 6, 6 -dibromoheptan-2-ol (B) 2, 2-dibromoheptan-2-ol  
 (C) 6, 6-dibromoheptan-2-al (D) 2, 6-dibromohydroxy heptane

22. Which of the following statements is not correct?

- (A) All metals are solid at room temperature.  
 (B) All metals are good conductors of heat and electricity.  
 (C) All metals form basic oxides.  
 (D) All metals possess lustre when freshly prepared.

Space for rough work

23. The metal that reacts with cold water is  
(A) Mercury (B) Sodium (C) Zinc (D) Tungsten
24. Brass is a mixture of  
(A) Copper and zinc  
(B) Copper and tin  
(C) Copper, nickel and zinc  
(D) Aluminium, copper and traces of Mg and Mn
25. Among  $\text{Al}_2\text{O}_3$ ,  $\text{SiO}_2$ ,  $\text{P}_2\text{O}_3$  and  $\text{SO}_2$  the correct order of acid strength is  
(A)  $\text{SO}_2 < \text{P}_2\text{O}_3 < \text{SiO}_2 < \text{Al}_2\text{O}_3$  (B)  $\text{Al}_2\text{O}_3 < \text{SiO}_2 < \text{P}_2\text{O}_3 < \text{SO}_2$   
(C)  $\text{Al}_2\text{O}_3 < \text{SiO}_2 < \text{SO}_2 < \text{P}_2\text{O}_3$  (D)  $\text{SiO}_2 < \text{SO}_2 < \text{Al}_2\text{O}_3 < \text{P}_2\text{O}_3$
26. The correct order of electron affinity among the following is  
(A)  $\text{F} > \text{Cl} > \text{Br}$  (B)  $\text{Br} > \text{Cl} > \text{F}$  (C)  $\text{Cl} > \text{F} > \text{Br}$  (D)  $\text{F} > \text{Br} > \text{Cl}$
27. Alkali metals in each period have  
(A) Smallest size (B) Lowest I.E.  
(C) Highest I.E. (D) Highest electronegativity
28. In the balanced equation  
$$\text{Cu} + x\text{HNO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + y\text{NO}_2 + 2\text{H}_2\text{O}$$
  
The values of x and y are  
(A) 3 and 5 (B) 8 and 6 (C) 4 and 2 (D) 7 and 1
29. Copper on exposure to air reacts with moisture and  $\text{CO}_2$  to develop a green layer which is chemically  
(A) basic copper carbonate (B) copper sulphate  
(C) copper carbonate (D) copper nitrate

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Space for rough work

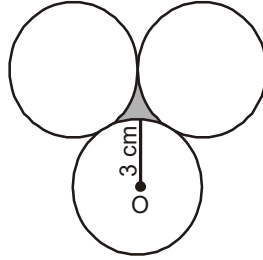
30. In the reaction  $\text{PCl}_3 + \text{Cl}_2 \rightarrow \text{PCl}_5$
- (A)  $\text{PCl}_3$  is acting as reductant  
(B)  $\text{Cl}_2$  is acting as reductant  
(C) both  $\text{PCl}_3$  and  $\text{Cl}_2$  are acting as reductant  
(D) both  $\text{PCl}_3$  and  $\text{Cl}_2$  are acting as oxidant.

### PART-C : MATHEMATICS

31. The HCF of 24, 32, and 60 is equal to  
(A) 4 (B) 6 (C) 8 (D) 3
32. The factors of  $\left(\frac{1}{3}x^2 - 2x - 9\right)$  is equal to  
(A)  $\frac{1}{3}(x-9)(x+3)$  (B)  $\frac{1}{3}(x-9)(x-3)$  (C)  $\frac{1}{3}(x+9)(x+3)$  (D)  $\frac{1}{3}(x+9)(x-3)$
33. The solution of the system of equations  $x + 3y = 4$  and  $4x + 7y = 1$  is  
(A)  $x = -5$  and  $y = 3$  (B)  $x = -2$  and  $y = 7$   
(C)  $x = 1$  and  $y = 1$  (D)  $x = 5$  and  $y = 4$
34. If  $(3 + i)$  is a root of the equation  $x^2 + ax + b = 0$  (where  $a, b \in \mathbb{R}$ ) then  $a$  is equal to  
(A) 3 (B) -3 (C) 6 (D) -6
35. The fourth term of an A.P. is 4. Then the sum of the first 7 terms is  
(A) 4 (B) 28 (C) 16 (D) 40
36. If  $\tan \theta = \frac{1}{\sqrt{7}}$  and  $\theta$  is an acute angle, then  $\frac{\text{cosec}^2\theta - \sec^2\theta}{\text{cosec}^2\theta + \sec^2\theta} \alpha$  is equal to  
(A)  $\frac{3}{4}$  (B)  $\frac{1}{2}$  (C) 2 (D)  $\frac{5}{4}$

Space for rough work

37. The distance of the point  $P(2, 3)$  from the x-axis is  
 (A) 2 (B) 3 (C) 1 (D) 5
38. If  $\sin\theta - \cos\theta = 0$ , then the value of  $(\sin^4\theta + \cos^4\theta)$  is  
 (A) 1 (B)  $\frac{3}{4}$  (C)  $\frac{1}{2}$  (D)  $\frac{1}{4}$
39. If three equal circles of radius 3 cm each touch each other externally as shown, then the area of the shaded portion is :



- (A)  $\frac{\sqrt{3}}{2}(2 - \pi) \text{ cm}^2$  (B)  $\frac{9}{2}(2\sqrt{3} - \pi) \text{ cm}^2$   
 (C)  $\frac{9}{2}(2\sqrt{3} + \pi) \text{ cm}^2$  (D)  $\frac{3}{2}(\sqrt{3} - \pi) \text{ cm}^2$
40. The number of observations in a group is 40. If the average of first 10 is 4.5 and that of the remaining 30 is 3.5, then the average of the whole group is equal to  
 (A)  $\frac{1}{5}$  (B)  $\frac{15}{4}$  (C) 4 (D) 8
41. An unbiased die is thrown, then the probability of getting a number greater than 1 is  
 (A)  $\frac{1}{6}$  (B)  $\frac{2}{6}$  (C)  $\frac{4}{6}$  (D)  $\frac{5}{6}$

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Space for rough work



42. The length of the parallel sides of a trapezium are 14 cm and 7 cm. If the length of third side is 8 cm and of fourth side is  $x$  cm, then the number of possible integral value of  $x$  is:

(A) 12 (B) 13 (C) 14 (D) 17

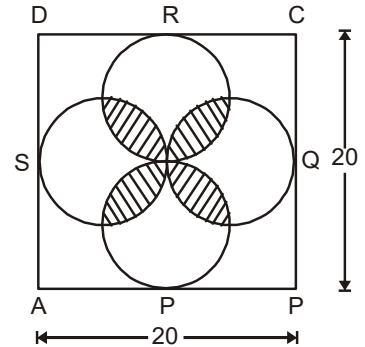
43. In the fig. below, ABCD is a square and 4 congruent circles are inscribed inside it such that each of the circles is touching the sides of the square at its mid-point. Then evaluate the area of the shaded region (in sq. units) :

(A)  $25\left(\frac{\pi}{2}-1\right)$

(B)  $50(\pi-1)$

(C)  $100\left(\frac{\pi}{2}-1\right)$

(D)  $200(\pi-1)$



44. If  $\sin \theta$  and  $\cos \theta$  are the roots of the equation  $ax^2 - bx + c = 0$ , then  $a$ ,  $b$  and  $c$  satisfy the relation

(A)  $a^2 + b^2 + 2ac = 0$

(B)  $a^2 - b^2 + 2ac = 0$

(C)  $a^2 + c^2 + 2ab = 0$

(D)  $a^2 - b^2 - 2ac = 0$

45. If  $\sin \theta = \sin \alpha$  then the value of  $\sin \frac{\theta}{3}$  can be

(A)  $\sin \frac{\alpha}{3}$

(B)  $\cos\left(\frac{\pi}{3}-\frac{\alpha}{3}\right)$

(C)  $\operatorname{cosec}\left(\frac{\pi}{3}+\frac{\alpha}{3}\right)$

(D) none of these

Space for rough work

## PART-D : MENTAL ABILITY

Find the missing number :

|    |    |    |
|----|----|----|
| 78 | ?  | 97 |
| 43 | 67 | 58 |
| 35 | 13 | 39 |

46.

- (A) 84                      (B) 80                      (C) 54                      (D) 48

47.

$$3 \begin{array}{c} 4 \\ \circlearrowleft 6 \\ 5 \end{array} 6 \quad 4 \begin{array}{c} 5 \\ \circlearrowleft 7 \\ 3 \end{array} 5 \quad 3 \begin{array}{c} 6 \\ \circlearrowleft ? \\ 4 \end{array} 7$$

- (A) 4                      (B) 9                      (C) 6                      (D) 8

48.

$$4 \begin{array}{c} 8 \\ \circlearrowleft 5 \\ 7 \end{array} 6 \quad 18 \begin{array}{c} 12 \\ \circlearrowleft 7 \\ 10 \end{array} 9 \quad 13 \begin{array}{c} 11 \\ \circlearrowleft 6 \\ 7 \end{array} ?$$

- (A) 9                      (B) 8                      (C) 6                      (D) 5

49. If in a code language **MENTAL** is coded as 417253, then how is **TEN & ANT** coded in that language ?

- (A) 572,271              (B) 217,527              (C) 572, 217              (D) 217, 572

50. If **REASON** is coded as 5 and **BELIEVED** as 7, what is the code number for **GOVERNMENT**?

- (A) 6                      (B) 8                      (C) 9                      (D) 10

51. If **E = 5 & SAFE = 31**, then **PINK = ?**

- (A) 41                      (B) 40                      (C) 50                      (D) 65

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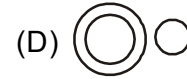
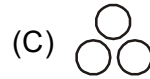
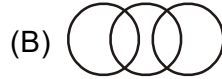
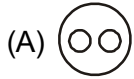
52. Amit faces towards North. Turning to his right he walks 25 metre. He then turns to his left and walks 30 metre. Then moves 25 metre to his right. He then turns to his right again and walks 55 metre. Finally, he turns to the right and moves 40 metre. In which direction is he now from his starting point ?
- (A) South-West      (B) South      (C) North-West      (D) South-East
53. Kishen walks 10 km towards North. From there, he walks 6 km towards South. Then, he walks 3 km towards East. How far and in which direction is he with reference to his starting point ?
- (A) 5 km, North      (B) 5 km, North-East      (C) 7 km, East      (D) 7 km, West
54. A man was facing East. He took Three paces forward, turned right, walked another two paces and then turned right again, took three paces and turned about. Which direction was he last facing ?
- (A) East      (B) North      (C) South      (D) None of these
55. Pointing to a photograph, a man says to his friend, "She is the grand-daughter of the elder brother of my father". How is the girl in the photograph related to the man ?
- (A) Niece      (B) Sister      (C) Aunt      (D) Sister-in-law
56. Pointing to a girl in the photograph. Amar said, "Her mother's brother is the only son of my mother's father". How is the girl's mother related to Amar ?
- (A) Mother      (B) Sister      (C) Sister-in-law      (D) Grandmother
57. T is the son of P. S. is the son of Q. T is married to R. R is Q's daughter. How is S related to T ?
- (A) Brother      (B) Uncle      (C) Father-in-law      (D) Brother-in-law

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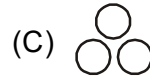
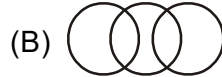
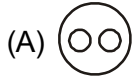
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**DIRECTIONS : (58 to 60) Each of these questions given below contains three group of things. You are to choose from the following four numbered diagrams, a diagram that depicts the correct relationship among the three groups of thing in each question.**

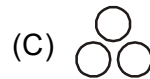
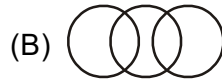
**58.** Moon, Earth, Universe



**59.** India, Pakistan, Asia



**60.** Batsman, Cricket, Stick



Space for rough work

# ANSWER KEY

## SAMPLE TEST PAPER

(For Students Going to Class 11<sup>TH</sup> IN 2024)

**STREAM : ENGINEERING | COURSE OFFERED : GROUND ZERO**

### PHYSICS

- |         |         |         |         |
|---------|---------|---------|---------|
| 1. (A)  | 2. (A)  | 3. (D)  | 4. (B)  |
| 5. (C)  | 6. (C)  | 7. (A)  | 8. (D)  |
| 9. (D)  | 10. (B) | 11. (D) | 12. (C) |
| 13. (A) | 14. (A) | 15. (B) |         |

### CHEMISTRY

- |         |         |         |         |
|---------|---------|---------|---------|
| 16. (C) | 17. (D) | 18. (D) | 19. (C) |
| 20. (D) | 21. (A) | 22. (A) | 23. (B) |
| 24. (A) | 25. (B) | 26. (C) | 27. (B) |
| 28. (C) | 29. (A) | 30. (A) |         |

### MATHEMATICS

- |         |         |         |         |
|---------|---------|---------|---------|
| 31. (A) | 32. (A) | 33. (A) | 34. (D) |
| 35. (B) | 36. (A) | 37. (B) | 38. (C) |
| 39. (B) | 40. (B) | 41. (D) | 42. (B) |
| 43. (C) | 44. (B) | 45. (A) |         |

### MENTAL ABILITY

- |         |         |         |         |
|---------|---------|---------|---------|
| 46. (B) | 47. (C) | 48. (D) | 49. (D) |
| 50. (C) | 51. (C) | 52. (D) | 53. (B) |
| 54. (A) | 55. (A) | 56. (A) | 57. (D) |
| 58. (A) | 59. (A) | 60. (D) |         |