Fortunate 40

Sample Paper
for Students presently in Class X

Paper 2 **Basic School, CUET, JEE Main**

Duration : 90 minutes   *Maximum Marks : 240*

Please read the instructions and guidelines carefully :

Important Note : Please ensure to accurately input the details for the Class and Paper No. as indicated at the top of this sheet into the corresponding columns / fields on the OMR sheet before proceeding with the paper. Incorrectly filled information regarding the class or paper may result in inaccurate outcomes or results.

> *"This paper has been scientifically designed to evaluate your potential – manifested and hidden for the target examinations mentioned in various sections of the paper. Thus, your adherence to the instructions is critical in the evaluation of the same"*

1. This Question paper consists of 3 sections.

2. **Student should devote allotted time for each section. If a section is easy, then it is easy for everyone & was meant to be like that with a goal in mind. Do not switch over to another section if you find the section to be easy. If a section is tough, then it is tough for everyone.** You are advised to spend 30 Minutes on Section-I, 30 Minutes on Section-II and 30 Minutes on Section-III. Dedicating the required time to finish each section successfully is essential. Opening the next section before completing the allotted time for the preceding section is not permitted. This adherence is crucial for assessing your true potential, as each section is meticulously crafted to evaluate your potential for the corresponding competitive examinations.

3. Candidate should open the seal of Section-II only after devoting 30 minutes on Section-I and Seal for Section-III is to be opened only after devoting 30 minutes on Section-II.

4. Sheets will be given to each candidate for rough work. Candidate must fill all details on the rough sheet and submit the same to invigilator along with OMR sheet. Candidate must mention the Question No. while doing the rough work in the sheet.

5. Please note candidates are not allowed to bring any prohibited items into the exam hall such as electronic devices, mobile phones, smart watch, earphones, calculators, books, notes, formula sheets, and bags.

6. Marking scheme is given in table below:

| Section	Subject		Question no.	Marking Scheme for each question	
				Correct answer	Wrong answer
SECTION – I (Basic School) Time Allotted: 30 Minutes	PHYSICS	(PART-A)	1 to 10	**+1**	**0**
	CHEMISTRY	(PART-B)	11 to 20	**+1**	**0**
	MATHEMATICS	(PART-C)	21 to 30	**+1**	**0**
SECTION – II (CUET) Time Allotted: 30 Minutes	PHYSICS	(PART-A)	31 to 40	**+5**	**−1**
	CHEMISTRY	(PART-B)	41 to 50	**+5**	**−1**
	MATHEMATICS	(PART-C)	51 to 60	**+5**	**−1**
SECTION – III (JEE Main) Time Allotted: 30 Minutes	PHYSICS	(PART-A)	61 to 65	**+4**	**−1**
	CHEMISTRY	(PART-B)	66 to 70	**+4**	**−1**
	MATHEMATICS	(PART-C)	71 to 75	**+4**	**−1**

Section – I

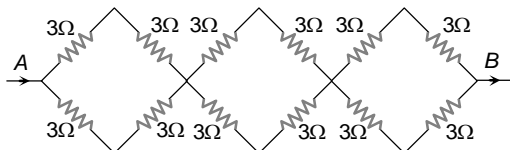## Time: 30 Minutes

PHYSICS – (PART – A)

*This part contains **10 Multiple Choice Questions** number **1 to 10.** Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

1. The focal length of a spherical mirror is equal to
   (A) $\dfrac{u+v}{uv}$
   (B) $\dfrac{1}{v}+\dfrac{1}{u}$
   (C) $\dfrac{uv}{u+v}$
   (D) $u+v$

2. Total internal reflection is possible to observe, when a light ray travels from
   (A) air into water
   (B) air into glass
   (C) water into glass
   (D) glass into water

3. The unit of refractive index is
   (A) metre
   (B) degree
   (C) dioptre
   (D) it has no units

4. In the figure of the human eye, the cornea is represented by the letter

   (A) A
   (B) B
   (C) C
   (D) D
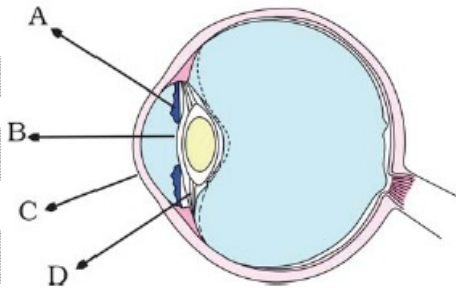
5. Myopia is the defect of vision due to which a person finds difficulty in seeing
   (A) distant objects
   (B) near objects
   (C) objects at all distance
   (D) colours

6. The light which undergoes least deviation through a prism is
   (A) Violet
   (B) Yellow
   (C) Red
   (D) Green

7. Colour of the eye is decided by
   (A) Iris
   (B) Pupil
   (C) Eye lens
   (D) Retina

8. The blue colour of the sky is due to the phenomenon of
    (A) scattering (B) dispersion
    (C) reflection (D) refraction

9. In the network of resistors shown in the adjoining figure, the equivalent resistance between *A* and *B* is

    (A) 54 ohm (B) 18 ohm
    (C) 36 ohm (D) 9 ohm

10. The light reflected by a plane mirror may form a real image
    (A) If the rays incident on the mirror are diverging
    (B) If the rays incident on the mirror are converging
    (C) If the object is placed very close to the mirror
    (D) Under no circumstances

CHEMISTRY – (PART – B)

*This part contains **10 Multiple Choice Questions** number **11 to 20**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

11. Which of the following non-metals sublimes on heating?
    (A) Fluorine (B) Chlorine (C) Bromine (D) Iodine

12. Acid rain is caused due to
    (A) CO_2, O_2, SO_2 (B) CO_2, NO_2, H_2
    (C) SO_2, N_2, O_2 (D) CO_2, SO_2, NO_2

13. Which of the following will undergo addition reaction?
    (A) CH_4 (B) C_3H_8
    (C) C_2H_6 (D) C_2H_4

14. Which of the following statement is false?
    (A) China rose is natural indicator
    (B) Repeated cultivation by farmers makes soil acidic
    (C) Ant or bee sting contains acetic acid
    (D) Majority of factories waste are acidic in nature

15. Baking powder is
    (A) a mixture (B) a compound
    (C) an element (D) a salt

16. Which of the following is not a hydrated salt?
    (A) Blue vitriol (B) Baking soda
    (C) Washing soda (D) Epsom salt

17. Reducing agent in thermite process is
   (A) Mg (B) Al
    (C) Cr (D) Fe

18. Which of the following pair will give displacement reaction?
    (A) NaCl solution and copper metal
    (B) $MgCl_2$ solution and Aluminium metal
    (C) $FeSO_4$ solution and silver metal
    (D) $AgNO_3$ solution and copper metal

19. Phenolphthalein is
    (A) yellow in acidic medium pink in basic medium
    (B) pink in acidic medium, colourless in basic medium
    (C) colourless in acidic medium, pink in basic medium
    (D) pink in acidic medium, yellow in basic medium

20. A soap molecules has a
    (A) hydrophobic head and hydrophobic tail
    (B) hydrophobic head and hydrophilic tail
    (C) hydrophilic head and hydrophilic tail
    (D) hydrophilic head and hydrophobic tail

MATHEMATICS – (PART – C)

*This part contains **10 Multiple Choice Questions** number **21 to 30**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

21. Which of the following straight lines passes through the origin?
    (A) x + y = 4
    (B) $x^2 + y^2 = -16$
    (C) x + y = 5
    (D) x = 4y

22. For what value of k the quadratic equation $12x^2 + 4kx + 3 = 0$ has equal zeroes.
    (A) 4
    (B) ± 5
    (C) –4
    (D) ± 3

23. The largest number that will divide 398,436 and 542 leaving remainders 7, 11 and 15 respectively is
    (A) 17
    (B) 11
    (C) 34
    (D) 45

24. If one of the zeroes of the cubic polynomial $x^3 + ax^2 + bx + c$ is –1, then the product of the other two zeroes is
    (A) b – a + 1
    (B) b – a – 1
    (C) a – b + 1
    (D) a – b –1

25. A vertical stick 20 m long casts a shadow 10 m long on the ground at the same time, a tower casts a shadow 50 m long on the ground, the height of the tower is
    (A) 100 m
    (B) 120 m
    (C) 25 m
    (D) 200 m

26. The slope of 2x + 3y + 4 = 0 is
    (A) $-\dfrac{3}{2}$
    (B) $-\dfrac{2}{3}$
    (C) $\dfrac{2}{3}$
    (D) $\dfrac{3}{2}$

27. If –4 is a root of the quadratic equation $x^2 + px - 4 = 0$ and the quadratic equation $x^2 + px + k = 0$ has equal roots, then the value of k is

    (A) 3
    (B) $\dfrac{4}{9}$

    (C) $\dfrac{7}{9}$
    (D) $\dfrac{9}{4}$

28. If the sum of the series 2+ 5+ 8+11 .... is 60100, then the numbers of terms are
    (A) 100
    (B) 200
    (C) 150
    (D) 250

29. If the roots of the equation $x^3 - 12x^2 + 39x - 28 = 0$ are in A.P., then their common difference will be
    (A) ± 1
    (B) ± 2
    (C) ± 3
    (D) ± 4

30. In the given figure, DE || BC. If AD = 3 cm, AB = 7 cm and EC = 3 cm, then the length of AE is
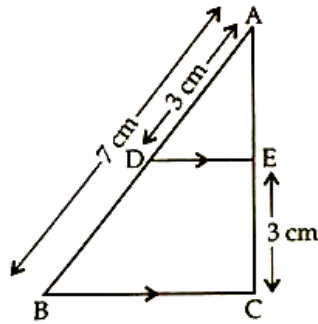
    (A) 2 cm
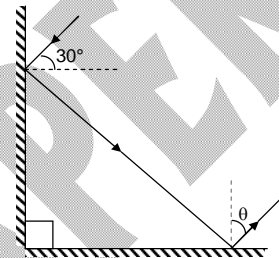   (B) 2.25 cm
    (C) 3.5 cm
    (D) 4 cm

Section – II

Time: 30 Minutes

PHYSICS – (PART – A)

*This part contains **10 Multiple Choice Questions** number **31 to 40**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

31. What is the value of θ in the following diagram?
    (A) 30°
    (B) 45°
    (C) 90°
    (D) 60°

32. If an incident ray passes through the centre of curvature of a spherical mirror, the reflected ray will
    (A) Pass through the pole
    (B) Pass through the focus
    (C) Retrace its path
    (D) both (A) and (B) are correct

33. The combination of a convex lens of focal length 6 cm and a concave lens of focal length f acts as a convex lens of focal length 8 cm. The value of f is
    (A) 12 cm
    (B) 15 cm
    (C) 24 cm
    (D) 3 cm

34. An air bubble in a glass slab of refractive index 1.5 is 5 cm deep when viewed from one face and 2 cm deep when viewed from the opposite face. The thickness of the slab is
    (A) 10.5 cm
    (B) 7 cm
    (C) 10 cm
    (D) 7.5 cm

35. A person cannot see an object lying beyond 10 metres. The power of lens used to rectify this defect will be
    (A) + 0.1 D
    (B) + 0.2 D
    (C) – 0.2 D
    (D) – 0.1 D

36. A convex lens and a concave lens, each having same focal length of 25 cm, are put in contact to form a combination of lenses. The power in diopters of the combination is
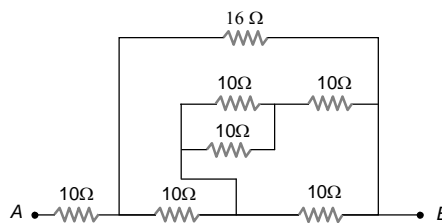   (A) zero
    (B) 25
    (C) 50
    (D) infinite

37. The critical angle for diamond (refractive index = 2) is
    (A) About 20°
    (B) 60°
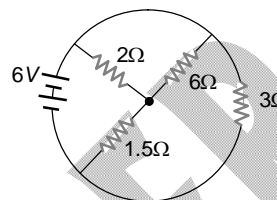   (C) 45°
    (D) 30°

38. Value of R_{eq} across A and B
    (A) 8 Ω
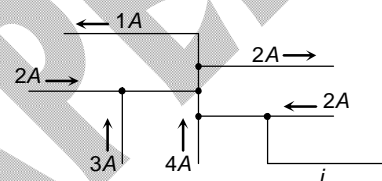   (B) 10 Ω
    (C) 18 Ω
    (D) 24 Ω

39. The total current supplied to the circuit by the battery is
    (A) 1 A
    (B) 2 A
    (C) 4 A
    (D) 6 A

40. The figure here shows a portion of a circuit. What are the magnitude of the current i in the lower right-hand wire
    (A) 7 A
    (B) 8 A
    (C) 6 A
    (D) 2 A

CHEMISTRY – (PART – B)

This part contains **10 Multiple Choice Questions** number **41 to 50**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

41. During roasting which of the following poisonous gas is mainly produced
    (A) CO   (B) CO_2
    (C) SO_2 (D) N_2O

42. Which species contain coordinate, covalent as well as ionic bonds?
    (A) H_2SO_4 (B) NH_4NO_3
    (C) NaOCl   (D) K_2CrO_4

43. In the following reactions, ZnO is respectively acting as a/an
    (i) $ZnO + Na_2O \rightarrow Na_2ZnO_2$
    (ii) $ZnO + CO_2 \rightarrow ZnCO_3$
    (A) base and acid   (B) base and base
    (C) acid and acid   (D) acid and base

44. The aqueous solution of disodium hydrogen phosphate is
    (A) Acidic   (B) Neutral
    (C) Basic   (D) None

45. Isomerism exhibit by acetic acid and methyl formate is
    (A) Functional   (B) Chain
    (C) Geometrical   (D) Central

46. Which of the following statement is false regarding metals?
    (A) All metals are solid in nature
    (B) Metals can be used to make cooking utensils
    (C) Generally most of metals having high melting and boiling points
    (D) Copper is used generally to make electrical wires

47.   Which of the following is acid salt(s)
       (i) Sodium bisulphite   (ii) potassium chloride
       (iii) potassium bisulphite   (iv) Sodium carbonate
       (A) (i), (ii) & (iv)   (B) (ii) & (iv)
       (C) (i), (ii) & (iii)   (D) (i) & (iii)

48.   Two test tubes A & B contain aqueous solutions of potassium iodide and lead nitrate separately.
       When these two test-tubes A & B are mixed to each other, results into x & y. The x & y are : -
       (A) yellow ppt. , yellow solution   (B) yellow ppt. , Colourless solution
       (C) white ppt. , yellow solution   (D) white ppt. , Colourless solution

49.   Which of the following reaction is endothermic?
       (A) $C + O_2 \rightarrow CO_2$ (B) $CaCO_3 \rightarrow CaO + CO_2$
       (C) $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ (D) $CaO + H_2O \rightarrow Ca(OH)_2$

50.   An element X on exposure to moist air turns reddish brown and a new compound Y is formed
       substance X and Y are
       (A) X = Ag, Y = Ag_2S (B) X = Cu, Y = Cu_2O
       (C) X = Al, Y = Al_2O_3 (D) X = Fe, Y = $Fe_2O_3.xH_2O$

MATHEMATICS – (PART – C)

*This part contains **10 Multiple Choice Questions** number **51 to 60**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

51.   If $a = \sqrt{11} + \sqrt{3}$, $b = \sqrt{12} + \sqrt{2}$ and $c = \sqrt{6} + \sqrt{4}$, then which of the following holds true?
       (A) c > a > b   (B) a > b > c
       (C) a > c > b   (D) b > a > c

52.   Four bells toll at intervals of 10 seconds, 15 seconds, 20 seconds and 30 seconds respectively. If
       they toll together at 10:00 am, at what time will they toll together for the first time after 10 am ?
       (A) 10:01 am   (B) 10:02 am
       (C) 10:00:30 am   (D) 10:00:45 am

53.   In how many ways can 1500 be resolved into two factors?
       (A) 18   (B) 12
       (C) 24   (D) 36

54.   If $\dfrac{\sin^2\theta - 5\sin\theta + 3}{\cos^2\theta} = 1$, then θ can be _____.
       (A) 30º   (B) 45º
       (C) 60º   (D) 0º

55.   In the given figure, $\overline{DE} \parallel \overline{AC}$. Find the value of x,
       (A) 1   (B) 2
       (C) 3   (D) 4

56.   If LCM of f(x) and g(x) is $6x^2 + 13x + 6$, then which of the following cannot be the HCF of f(x) and
       g(x)?
       (A) 2x + 3   (B) 3x + 1
       (C) (2x + 3)(3x + 2)   (D) 3x + 2

57. If $\sqrt[x]{75} = \sqrt[y]{45} = \sqrt[z]{15} = 0$, then which of the statement is true :
(A) $x + y = 2z$ (B) $x + y = 3z$
(C) $x - y = 2z$ (D) $x - y = 3z$

58. In the figure below (not to scale), $\overline{AB} \perp \overline{CD}$ AD is the bisector of $\angle BAE$. AB = 3 cm and AC = 5 cm. Find CD.
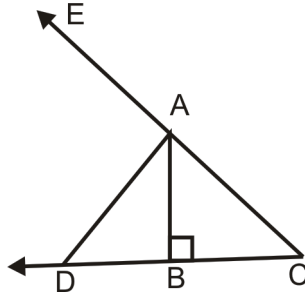
(A) 6 cm
(C) 10 cm   (B) 8 cm
                                   (D) None of these

59. Choose the correct value of $\dfrac{1}{\sqrt{9}+\sqrt{10}} + \dfrac{1}{\sqrt{10}+\sqrt{11}} + \dfrac{1}{\sqrt{11}+\sqrt{12}} + \ldots$ up to 91 terms from the following options:
(A) 7   (B) 8
(C) 6   (D) 9

60. In a $\triangle ABC$, $\angle B < \angle C$ and the values of B and C satisfy the equation $2 \tan x - k(1 + \tan^2 x) = 0$, where $(0 < k < 1)$. Then the measure of $\angle A$ is
(A) $\dfrac{\pi}{3}$ (B) $\dfrac{2\pi}{3}$
(C) $\dfrac{\pi}{2}$ (D) $\dfrac{3\pi}{4}$

Section – III

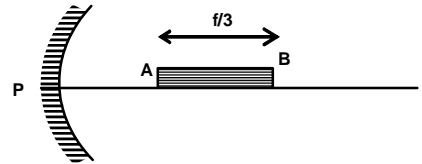## Time: 30 Minutes

PHYSICS – (PART – A)

*This part contains **TWO (02)** comprehensions. Based on each comprehension, there are **THREE (03)** questions in Comprehension-1 & **TWO (02)** questions in Comprehension-2 of **Multiple Choice Questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

Comprehension–1 for Q. No. 61 to 63

A thin rod of length 5 cm lies along the principal axis of the concave mirror of focal length 15 cm in such a way that the end closer to the pole is 30 cm away from it (as shown in figure)
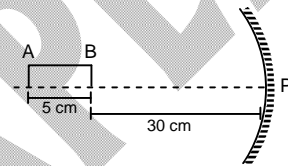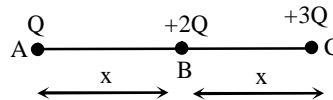

61. Find the distance of image of 'A' from pole 'P'.
    (A) 20.25   (B) 22.5
    (C) 35   (D) 26.25

62. Find the distance of image of 'B' from pole 'P'.
    (A) 20 cm   (B) 30 cm
    (C) 15 cm   (D) 10 cm

63. A thin rod of length f/3 is placed along the optic axis of a concave mirror of focal length f such that its image, which is real and diminished, just, touches the rod. Centre of curvature is at
    (A) A
    (B) B
    (C) between A and B
    (D) between A and P

Comprehension–2 for Q. No. 64 to 65

The charges of value Q, +2Q, +3Q are placed at point A, B, and C respectively.

64. Find the force on charge A:
    (A) $\dfrac{9}{4}\dfrac{KQ^2}{x^2}$ (B) $\dfrac{10}{4}\dfrac{KQ^2}{x^2}$
    (C) $\dfrac{11}{4}\dfrac{KQ^2}{x^2}$ (D) $\dfrac{13}{4}\dfrac{KQ^2}{x^2}$

65. Find the force on charge B:
    (A) $5\dfrac{KQ^2}{x^2}$ (B) $6\dfrac{KQ^2}{x^2}$
    (C) $7\dfrac{KQ^2}{x^2}$ (D) $4\dfrac{KQ^2}{x^2}$

CHEMISTRY – (PART – B)

*This part contains **TWO (02)** comprehensions. Based on each comprehension, there are **THREE (03)** questions in Comprehension-1 & **TWO (02)** questions in Comprehension-2 of **Multiple Choice Questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

Comprehension–1 for Q. No. 66 to 68

A homologous series is a collection of compounds with the same general formula that differ only in the carbon chain length. Compounds in a homologous series have same functional groups, resulting in chemical and physical properties that are comparable.
The homologous series of straight-chained alkanes
begins methane (CH_4), ethane (C_2H_6), propane (C_3H_8), butane (C_4H_{10}), and pentane (C_5H_{12}).

66. Which of the following is not observed in a homologous series?
    (A) Change in chemical properties
    (B) Difference in $-CH_2$ and 14u molecular mass
    (C) Gradation in physical properties
    (D) Same functional group

67. Which group of compounds is part of a homologous series?
    (A) CH_4, C_2H_4, C_3H_8 (B) C_3H_6, C_3H_8, C_3H_7OH
    (C) CH_3OH, C_2H_5OH, C_3H_7OH (D) CH_3CO_2H, CH_3CH_2OH, HCO_2H

68. C_5H_{12} belongs to the homologous series of
    (A) Alkynes   (B) Alkenes
    (C) Alkanes   (D) Cyclo alkanes

Comprehension–2 for Q. No. 69 to 70

An oxidizing agent (often referred to as an oxidant) is a chemical species that tends to oxidize other substances, A substance which loses electrons to other substances in a redox reaction and gets oxidised to a higher valency state is called a reducing agent. A redox equation can be balanced using the following stepwise procedure: (1) Divide the equation into two half-reactions. (2) Balance each half-reaction for number of atoms and charge. (3) Equalize the number of electrons transferred in each half-reaction. (4) Add the half-reactions together

69. What is the value of x in given equation?
    $$yAl + xH^+ \rightarrow yAl^{3+} + zH_2$$
    (A) 2   (B) 4
    (C) 6   (D) 8

70. What is the ratio of coefficients reducing agent to oxidizing agent, if the following reaction is correcting balanced?
    $$NH_3 + O_2 \rightarrow NO + H_2O$$
   (A) 4 : 5   (B) 5 : 4
    (C) 5 : 3   (D) 3 : 5

MATHEMATICS – (PART – C)

*This part contains **TWO (02)** comprehensions. Based on each comprehension, there are **THREE (03)** questions in Comprehension-1 & **TWO (02)** questions in Comprehension-2 of **Multiple Choice Questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

Comprehension–1 for Q. No. 71 to 73

In the adjoining figure, I and II are circles with centre P and Q respectively. The two circles touch each other and have a common tangent that touches them at point R and S respectively. This common tangent meet the line joining P and Q at O. The diameters of I and II are in the ratio 4 : 3. It is known that the length of PO is 28 cm.
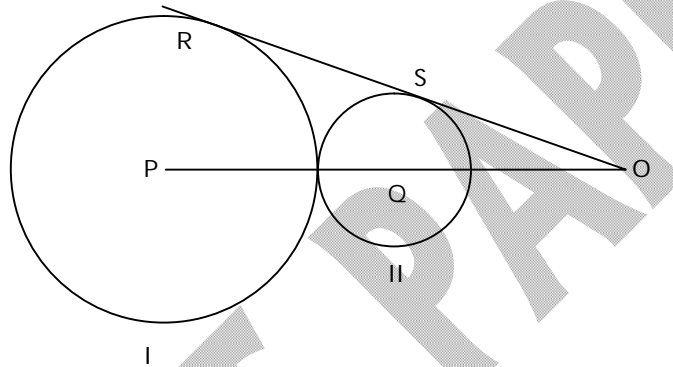
71. What is the ratio of the length of PQ to that of QO?
    (A) 1 : 2   (B) 2 : 3
    (C) 1 : 3   (D) 3 : 1

72. Radius of circle II is
    (A) 3/2 cm   (B) 5/2 cm
    (C) 3 cm   (D) none of these

73. The length of so is
    (A) $10\sqrt{3}$ cm   (B) $12\sqrt{3}$ cm
    (C) $7\sqrt{3}$ cm   (D) $16\sqrt{3}$ cm

Comprehension–2 for Q. No. 74 to 75

If α, β, γ are the zeroes of $ax^3 + bx^2 + cx + d$, then

$$\sum \alpha = -\frac{b}{a}, \sum \alpha\beta = \frac{c}{a}, \alpha\beta\gamma = -\frac{d}{a}$$

74. If α, β, γ are the zeroes of $x^3 - 5x^2 - 2x + 24$ and $\alpha\beta = 12$ then $\gamma =$
    (A) 2   (B) – 2
    (C) 3   (D) –3

75. If α, β, γ are zeroes of $x^3 - 5x^2 - 16x + 80$ the sum of zeroes are :
    (A) 3   (B) 4
    (C) 5   (D) 2

Fortunate **40**

Sample Paper

for Students presently in Class X

Paper 2 Basic School, CUET, JEE Main

ANSWER KEY

1.	**C**	2.	**D**	3.	**D**	4.	**C**
5.	**A**	6.	**C**	7.	**A**	8.	**A**
9.	**D**	10.	**B**	11.	**D**	12.	**D**
13.	**D**	14.	**C**	15.	**A**	16.	**B**
17.	**B**	18.	**D**	19.	**C**	20.	**D**
21.	**D**	22.	**D**	23.	**A**	24.	**A**
25.	**A**	26.	**B**	27.	**D**	28.	**B**
29.	**C**	30.	**B**	31.	**D**	32.	**C**
33.	**C**	34.	**A**	35.	**D**	36.	**A**
37.	**D**	38.	**C**	39.	**C**	40.	**B**
41.	**C**	42.	**B**	43.	**D**	44.	**C**
45.	**A**	46.	**A**	47.	**D**	48.	**B**
49.	**B**	50.	**D**	51.	**B**	52.	**A**
53.	**B**	54.	**A**	55.	**A**	56.	**B**
57.	**B**	58.	**C**	59.	**A**	60.	**C**
61.	**D**	62.	**B**	63.	**A**	64.	**C**
65.	**D**	66.	**A**	67.	**C**	68.	**C**
69.	**C**	70.	**A**	71.	**C**	72.	**C**
73.	**B**	74.	**B**	75.	**C**		