

Diagnostic cum Scholarship Tests

SAMPLE PAPER

For Students of Class XI

Paper 2

Other Engineering Entrance Exam & JEE Main

Duration : 90 minutes

Paper Code: 1011-2

Maximum Marks : 192

Please read the instructions and guidelines carefully :

Important Note : Please ensure to accurately input the details for the Question Paper Code as indicated at the top of this sheet (Side 2) 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 2 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 45 Minutes on Section-I & 45 Minutes on Section-II. 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 45 minutes on Section-I.
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 (Other Engineering Entrance Exam) Time Allotted: 45 Minutes	PHYSICS (PART-A)	1 to 4	+4	-1
	CHEMISTRY (PART-B)	5 to 8	+4	-1
	MATHEMATICS (PART-C)	9 to 12	+4	-1
	PHYSICS (PART-D)	13 to 16	+4	-1
	CHEMISTRY (PART-E)	17 to 20	+4	-1
	MATHEMATICS (PART-F)	21 to 24	+4	-1
SECTION – II (JEE Main) Time Allotted: 45 Minutes	PHYSICS (PART-A)	25 to 28	+4	-1
	CHEMISTRY (PART-B)	29 to 32	+4	-1
	MATHEMATICS (PART-C)	33 to 36	+4	-1
	PHYSICS (PART-D)	37 to 40	+4	-1
	CHEMISTRY (PART-E)	41 to 44	+4	-1
	MATHEMATICS (PART-F)	45 to 48	+4	-1

Section - I

Time: 45 Minutes

PHYSICS - (PART - A)

This part contains 4 Multiple Choice Questions number 1 to 4. 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

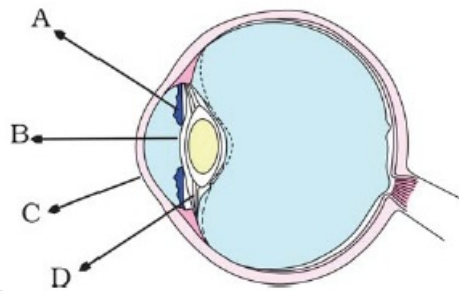
(A) $\frac{u+v}{uv}$

(B) $\frac{1}{v} + \frac{1}{u}$

(C) $\frac{uv}{u+v}$

(D) $u+v$

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



(A) A
(C) C

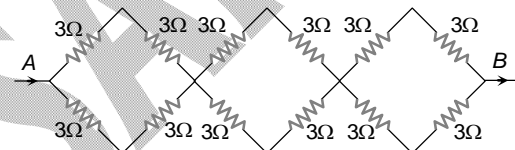
(B) B
(D) D

3. The blue colour of the sky is due to the phenomenon of

(A) scattering
(C) reflection

(B) dispersion
(D) refraction

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



(A) 54 ohm
(C) 36 ohm

(B) 18 ohm
(D) 9 ohm

CHEMISTRY – (PART – B)

This part contains 4 Multiple Choice Questions number 5 to 8. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

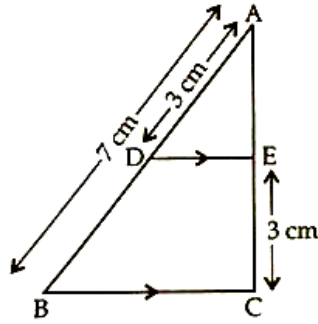
5. Which of the following non-metals sublimes on heating?
 (A) Fluorine (B) Chlorine
 (C) Bromine (D) Iodine
6. Which of the following will undergo addition reaction?
 (A) CH_4 (B) C_3H_8
 (C) C_2H_6 (D) C_2H_4
7. Reducing agent in thermite process is
 (A) Mg (B) Al
 (C) Cr (D) Fe
8. A soap molecule 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 4 Multiple Choice Questions number 9 to 12. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

9. 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
10. 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) $\frac{4}{9}$
 (C) $\frac{7}{9}$ (D) $\frac{9}{4}$
11. 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

12. In the given figure, $DE \parallel BC$. If $AD = 3$ cm, $AB = 7$ cm and $EC = 3$ cm, then the length of AE is



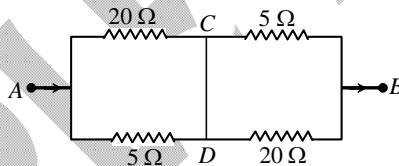
- (A) 2 cm
(B) 2.25 cm
(C) 3.5 cm
(D) 4 cm

PHYSICS – (PART – D)

This part contains **TWO (02)** comprehensions. Based on each comprehension, there are **TWO (02)** questions 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. 13 to 14

When some potential difference is maintained between A and B , current I enters the network at A and leaves at B .



13. Same potential points
(A) C & D
(B) C & B
(C) C & A
(D) A & B
14. Current $\frac{3I}{5}$ flows from
(A) C to D
(B) D to C
(C) A to C
(D) None of these

Comprehension-2 for Q. No. 15 to 16

The light ray is incident at angle of 60° on a prism of angle 45° . When the light ray falls on the other surface at 90°

15. In this case refractive index of the material of prism μ
(A) $\mu = \sqrt{\frac{3}{5}}$
(B) $\mu = 1.5$
(C) $\mu = \frac{\sqrt{3}}{2}$
(D) $\mu = \sqrt{\frac{3}{2}}$

16. The angle of deviation δ is
 (A) $\delta = 30^\circ$ (B) $\delta = 15^\circ$
 (C) $\delta = 60^\circ$ (D) none of these

CHEMISTRY - (PART - E)

This part contains **TWO (02)** comprehensions. Based on each comprehension, there are **TWO (02)** questions 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. 17 to 18

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

17. What is the value of x in given equation?
 $yAl + xH^+ \rightarrow yAl^{3+} + zH_2$
 (A) 2 (B) 4
 (C) 6 (D) 8
18. What is the ratio of coefficients reducing agent to oxidizing agent, if the following reaction is correctly balanced?
 $NH_3 + O_2 \rightarrow NO + H_2O$
 (A) 4 : 5 (B) 5 : 4
 (C) 5 : 3 (D) 3 : 5

Comprehension-2 for Q. No. 19 to 20

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}).

19. 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
20. C_5H_{12} belongs to the homologous series of
 (A) Alkynes (B) Alkenes
 (C) Alkanes (D) Cyclo alkanes

MATHEMATICS – (PART – F)

This part contains **TWO (02)** comprehensions. Based on each comprehension, there are **TWO (02)** questions 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. 21 to 22

Let $ax + by + c = 0$ be the equation of a straight line, then

(i) The equation of a line passing through the point (x_1, y_1) and parallel to the given line is given by $a(x - x_1) + b(y - y_1) = 0$.

(ii) The equation of a line passing through the point (x_1, y_1) and perpendicular to the given line is given by $b(x - x_1) - a(y - y_1) = 0$

21. Find the equation of a line passing through the point A (2, -3) and parallel to the line $2x - 3y + 6 = 0$.
- (A) $2x + 3y + 13 = 0$ (B) $2x - 3y + 13 = 0$
 (C) $2x - 3y - 13 = 0$ (D) $2x + 3y - 13 = 0$
22. Find the equation of a line passing through the point (5, 2) and perpendicular to the line $3x - y + 6 = 0$.
- (A) $x + 3y - 11 = 0$ (B) $x - 3y + 11 = 0$
 (C) $x - 3y - 11 = 0$ (D) $x + 3y + 11 = 0$

Comprehension-2 for Q. No. 23 to 24

The given equations are a linear equations in two variable

$$\begin{aligned} kx - y &= 2 \\ 6x - 2y &= 3 \end{aligned}$$

23. Find the value of k for which the system of equation gives a unique solution
- (A) -2 (B) 2
 (C) -3 (D) all of these
24. Find the value of k for which the system of equation gives no solution
- (A) 3 (B) 2
 (C) 1 (D) -3

Section – II

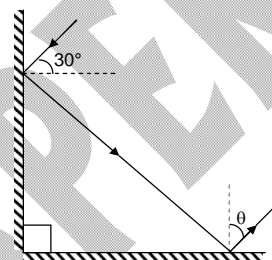
Time: 45 Minutes

PHYSICS – (PART – A)

This part contains 4 Multiple Choice Questions number 25 to 28. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

25. What is the value of θ in the following diagram?

(A) 30°
 (B) 45°
 (C) 90°
 (D) 60°

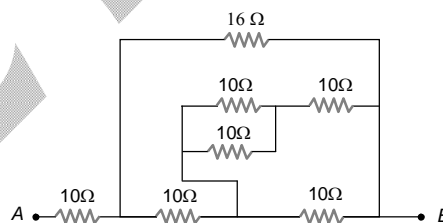


26. If an incident ray passes through the centre of curvature of a spherical mirror, the reflected ray will

(A) Pass through the pole
 (B) Pass through the focus
 (C) Retrace its path
 (D) both (A) and (B) are correct

27. Value of R_{eq} across A and B

(A) $8\ \Omega$
 (B) $10\ \Omega$
 (C) $18\ \Omega$
 (D) $24\ \Omega$



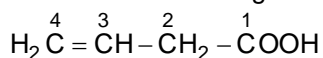
28. The critical angle for diamond (refractive index = 2) is

(A) About 20°
 (B) 60°
 (C) 45°
 (D) 30°

CHEMISTRY – (PART – B)

This part contains 4 Multiple Choice Questions number 29 to 32. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

29. Which of the following carbon atoms is likely to possess tetrahedral geometry?



(A) 1
 (B) 2
 (C) 3
 (D) 4

30. The strong conjugate base is

(A) NO_3^{2-}
 (B) Cl^-
 (C) SO_4^{2-}
 (D) CH_3COO^-

31. In the disproportionation reaction (unbalanced),
 $\text{Br}_2 + \text{OH}^- \rightarrow \text{Br}^- + \text{BrO}_3^- + \text{H}_2\text{O}$,
 the ratio of Br_2 molecules undergoing oxidation and reduction is
 (A) 5:1 (B) 1:5
 (C) 2:3 (D) 3:2
32. What is the concentration of the solution that results from mixing 40.0 mL of 0.200 M HCl with 60.0 mL of 0.100 M NaOH?
 (A) 0.150 M NaCl
 (B) 0.0200 M NaCl and 0.0200 M HCl
 (C) 0.0200 M NaCl and 0.0600 M HCl
 (D) 0.0600 M NaCl and 0.0200 M HCl

MATHEMATICS – (PART – C)

This part contains 4 Multiple Choice Questions number 33 to 36. Each question has 4 choices (A), (B), (C) and (D), out of which ONLY ONE is correct.

33. 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) $b > a > c$
34. If $\frac{\sin^2 \theta - 5 \sin \theta + 3}{\cos^2 \theta} = 1$, then θ can be _____.
 (A) 30° (B) 45°
 (C) 60° (D) 0°
35. 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) $3x + 2$
36. Choose the correct value of $\frac{1}{\sqrt{9} + \sqrt{10}} + \frac{1}{\sqrt{10} + \sqrt{11}} + \frac{1}{\sqrt{11} + \sqrt{12}} + \dots$ up to 91 terms from the following options:
 (A) 7 (B) 8
 (C) 6 (D) 9

PHYSICS – (PART – D)

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

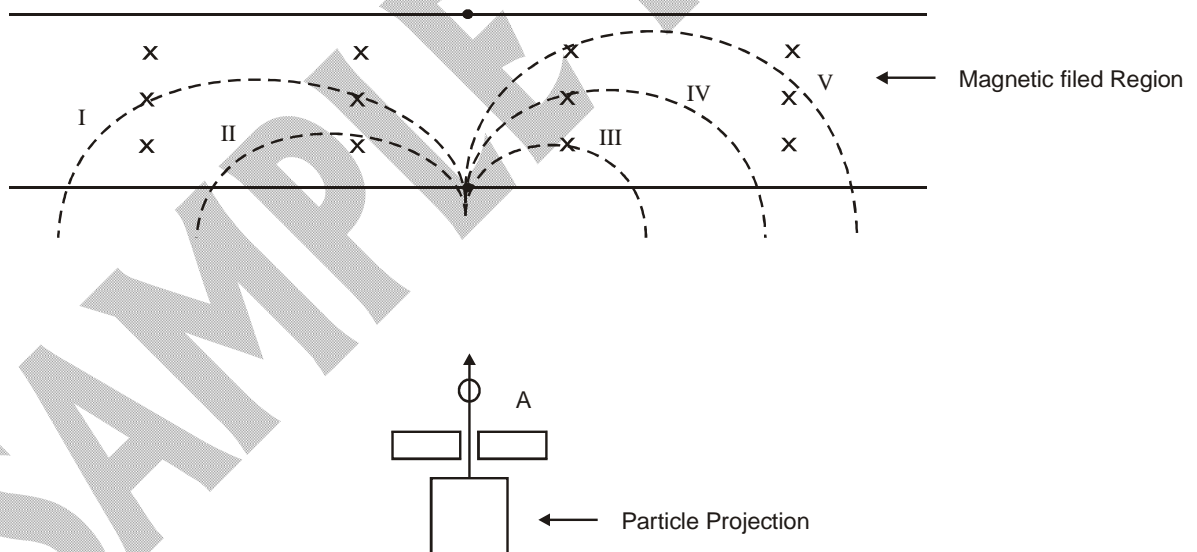
Comprehension-1 for Q. No. 37 to 38

An ammeter and a voltmeter are connected in series to a battery with emf $E = 6$ volt and negligible resistance. When a resistance $R = 3 \Omega$ is connected in parallel to voltmeter, reading of ammeter increases three times while that of voltmeter reduces to one third.

37. The resistance of ammeter is
 (A) 24Ω (B) 8Ω
 (C) 4Ω (D) 3Ω
38. The resistance of voltmeter is
 (A) 24Ω (B) 8Ω
 (C) 4Ω (D) 3Ω

Comprehension-2 for Q. No. 39 to 40

Difference particles are projected from point A towards magnetic field region as shown in diagram.



They move in circular orbits and then come out of region. Path of some particles are shown in figure.

39. If a particle having mass m , charge q & velocity v traces path IV, then path traced by another particle having same charge & velocity but double the mass of previous particle can be (approx.)
 (A) I (B) II
 (C) III (D) V
40. If path traced by electron is II then path traced by proton cannot be
 (A) I (B) II
 (C) III (D) V

CHEMISTRY – (PART – E)

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

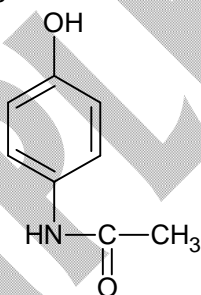
Comprehension-1 for Q. No. 41 to 42

When atoms of elements combine to form molecules, a force of attraction is developed between atoms which hold them together. This is called a chemical bond. Chemical bond can be ionic or covalent.

41. The cation and anion present in quick lime respectively are
 (A) Ca^{2+} and O^{2-} (B) Ca^{2+} and Cl^-
 (C) O^{2-} and Ca^{2+} (D) Ca^{2+} and CO_3^{2-}
42. Which of the following is an ionic compound?
 (A) Methane (B) Calcium chloride
 (C) Water (D) Carbon dioxide

Comprehension-2 for Q. No. 43 to 44

Paracetamol also known as acetaminophen, is a medicine used to treat fever and mild to moderate pain. Paracetamol was first made in 1877. The recommended daily dose for an adult is three to four grams. Its higher doses may lead to toxicity including liver failure. The structural formula of paracetamol is



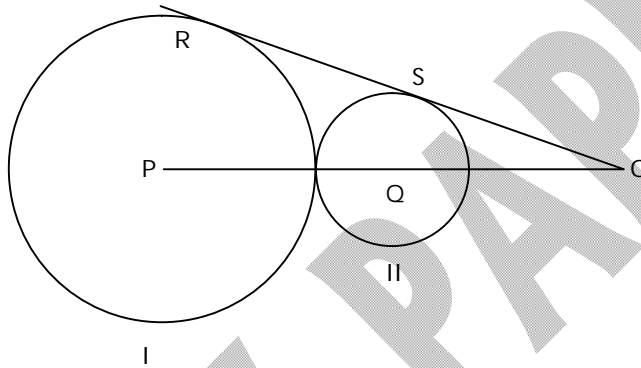
43. A functional group present in paracetamol is
 (A) Ester (B) Hydroxyl group
 (C) Ketone (D) Carboxylic acid group
44. The molecular formula of paracetamol can be written as
 (A) $\text{C}_8\text{H}_9\text{NO}_2$ (B) $\text{C}_7\text{H}_5\text{NO}_2$
 (C) $\text{C}_8\text{H}_{10}\text{NO}_2$ (D) $\text{C}_7\text{H}_{10}\text{NO}_2$

MATHEMATICS – (PART – F)

This part contains **TWO (02)** comprehensions. Based on each comprehension, there are **TWO (02)** questions 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. 45 to 46

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.



45. 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
46. Radius of circle II is
 (A) $3/2$ cm (B) $5/2$ cm
 (C) 3 cm (D) none of these

Comprehension-2 for Q. No. 47 to 48

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

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

47. 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
48. 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

FIITJEE

Diagnostic cum Scholarship Tests

SAMPLE PAPER

For Students of Class XI

Paper 2

Other Engineering Entrance Exam & JEE Main

Paper Code: 1011-2

ANSWER KEY

1.	C	2.	C	3.	A	4.	D
5.	D	6.	D	7.	B	8.	D
9.	A	10.	D	11.	C	12.	B
13.	A	14.	B	15.	D	16.	B
17.	C	18.	A	19.	A	20.	C
21.	C	22.	A	23.	D	24.	A
25.	D	26.	C	27.	C	28.	D
29.	B	30.	D	31.	B	32.	D
33.	B	34.	A	35.	B	36.	A
37.	B	38.	A	39.	D	40.	A
41.	A	42.	B	43.	B	44.	A
45.	C	46.	C	47.	B	48.	C