

Diagnostic cum Scholarship Tests

SAMPLE PAPER

For Students of Class X

Paper 3

JEE Main & JEE Advanced

Paper Code: 910-3

Duration : 135 minutes

Maximum Marks : 201

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 and 90 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 (JEE Main) Time Allotted: 45 Minutes	PHYSICS (PART-A & D)	1 to 4 & 13 to 16	+4	-1
	CHEMISTRY (PART-B & E)	5 to 8 & 17 to 20	+4	-1
	MATHEMATICS (PART-C & F)	9 to 12 & 21 to 24	+4	-1
SECTION – II (JEE Advanced) Time Allotted: 90 Minutes	PHYSICS (PART-A & G)	25 to 27 & 40 to 45	+3	-1
	CHEMISTRY (PART-B & H)	28 to 30 & 46 to 51	+3	-1
	MATHEMATICS (PART-C & I)	31 to 33 & 52 to 57	+3	-1
	PHYSICS (PART-D)	34 to 35	+4 *Partial Marking	-2
	CHEMISTRY (PART-E)	36 to 37	+4 *Partial Marking	-2
	MATHEMATICS (PART-F)	38 to 39	+4 *Partial Marking	-2

* Partial Marking: (Q. No. 34 to 39):

Full Marks	: +4	If only (all) the correct option(s) is(are) chosen;
Partial Marks	: +3	If all the four options are correct but ONLY three options are chosen;
Partial Marks	: +2	If three or more options are correct but ONLY two options are chosen, both of which are correct;
Partial Marks	: +1	If two or more options are correct but ONLY one option is chosen and it is a correct option;
Zero Marks	: 0	If none of the options is chosen (i.e. the question is unanswered)
Negative Marks	: -2	In all other cases.

Section - I

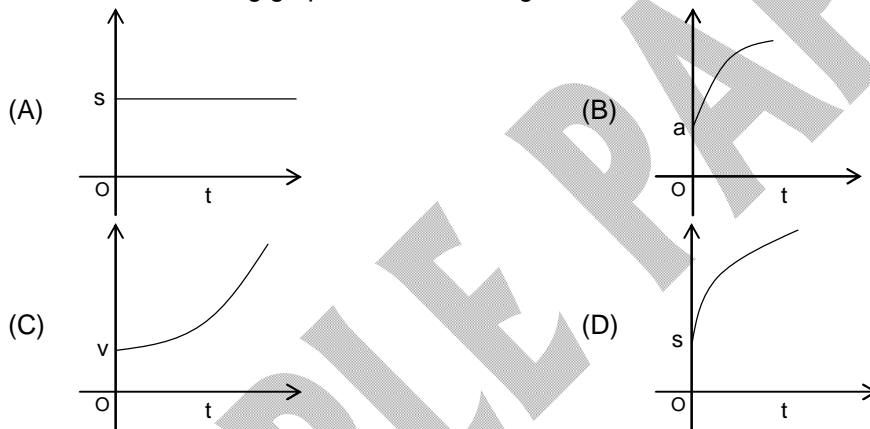
Time: 45 Minutes

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. If the linear momentum is increased by 5%, the kinetic energy will increase by :
(A) 50% (B) 100%
(C) 125% (D) 10%

2. Which of the following graph shows retarding motion?



3. The location of a particle is changed. What can we say about the displacement and distance covered by the particle?
(A) Both cannot be zero
(B) One of the two may be zero
(C) Both must be zero
(D) If one is positive, the other is negative and vice-versa
4. If the metal bob of a simple pendulum is replaced by a wooden bob, then its time period will
(A) increase (B) decrease
(C) remain the same (D) may be increase or decrease

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. Volume occupied by one molecule of water (density = 1 g cm^{-3}) is
(A) $5.5 \times 10^{-23} \text{ cm}^3$ (B) $9.0 \times 10^{-23} \text{ cm}^3$
(C) $6.023 \times 10^{-23} \text{ cm}^3$ (D) $3.0 \times 10^{-23} \text{ cm}^3$

6. 10g of MnO_2 on reaction with HCl forms 2.24L of Cl_2 (g) at NTP, the percentage impurity of MnO_2 is $\text{MnO}_2 + 4\text{HCl} \rightarrow \text{MnCl}_2 + \text{Cl}_2 + 2\text{H}_2\text{O}$
- (A) 87% (B) 25%
(C) 33.3% (D) 13%
7. Solubility is a good separation technique for
- (A) Pure metal (B) Noble gas
(C) Different salts (D) Metallic alloys
8. For 20% decrease in volume of given amount of an Ideal gas at constant temperature, its pressure should be increased by
- (A) 20 % (B) 25 %
(C) Less than 20 % (D) Can't be calculated

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. Two parallel chords of lengths 11 cm and 5 cm are at a distance of 3 cm of a circle. Find the radius of the circle.
- (A) $\frac{\sqrt{146}}{2}$ cm (B) $\frac{\sqrt{246}}{4}$ cm
(C) $\frac{\sqrt{346}}{2}$ cm (D) $\frac{\sqrt{346}}{4}$ cm
10. The sum of length, breadth and depth of a cuboid is 19 cm and the length of its diagonal is 11 cm. Find the surface area of the cuboid.
- (A) 250 square units (B) 240 square units
(C) 260 square units (D) None of these
11. When $(x^3 - 2x^2 + px - q)$ is divided by $(x^2 - 2x - 3)$, the remainder is $(x - 6)$. The value of p and q are:
- (A) $p = -2, q = -6$ (B) $p = 2, q = -6$
(C) $p = -2, q = 6$ (D) $p = 2, q = 6$
12. If A (2, 3), B (-3, -7) and C(a, b) are the vertices of a triangle with (0, 0) as its centroid. The coordinates of C are
- (A) (-1, 4) (B) (1, -4)
(C) (3, 7) (D) (1, 4)

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

Mechanical energy exists in two forms: Kinetic energy and potential energy. Kinetic energy is the energy possessed by virtue of motion of a body. Potential energy is the energy possessed by virtue of its position or configuration. These two forms of energy are inter convertible. If no other forms of energy is involved in a process, the sum of kinetic energy and potential energy always remains constant.

13. Two particles of masses m_1 and m_2 have equal linear momenta. The ratio of their kinetic energy is
- (A) 1 (B) $\sqrt{\frac{m_2}{m_1}}$
 (C) $\frac{m_2}{m_1}$ (D) $\left(\frac{m_2}{m_1}\right)^2$
14. Two particles of masses m_1 and m_2 have equal kinetic energies. The ratio of their linear momenta $\frac{p_1}{p_2}$ is
- (A) 1 (B) $\sqrt{\frac{m_2}{m_1}}$
 (C) $\sqrt{\frac{m_1}{m_2}}$ (D) $\left(\frac{m_2}{m_1}\right)^2$

Comprehension-2 for Q. No. 15 to 16

Two bodies of masses 1 kg and 4 kg respectively are placed at a separation of 2 m. Assuming that only gravitational forces act.

15. Find the force with which 1 kg mass attracts 4 kg mass.
 (A) 6.67×10^{-11} N (B) 1.33×10^{-10} N
 (C) 133×10^{-10} N (D) 2.66×10^{-10} N
16. Find the acceleration of 1 kg mass.
 (A) 6.67×10^{-11} m/s² (B) 1.33×10^{-10} m/s²
 (C) 1.3×10^{-10} m/s² (D) 2.66×10^{-10} m/s²

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

For two gases having densities d_1 and d_2 and rates of diffusion r_1 and r_2 under similar conditions of temperature and pressure

$$\frac{r_1}{r_2} = \sqrt{\frac{d_2}{d_1}}$$

Here, the term 'Rate of effusion or diffusion' implies as under:

Rate of effusion/diffusion

$$= \frac{\text{Volume of the gas effused / diffused}}{\text{Time taken}}$$

As mol. mass = 2 × vapour density, we can also write

$$\frac{r_1}{r_2} = \sqrt{\frac{M_2}{M_1}}$$

where M_1 and M_2 are the molecular masses of the two gases.

17. X ml of H_2 effuse out through a hole in a container in 5 seconds. The time taken for the effusion of the same volume of the gas specified below under identical conditions is
 (A) 10 sec. ; H_2 (B) 20 sec. ; O_2
 (C) 25 sec. ; CO (D) 55 sec. ; CO_2
18. Containers A, B and C of equal volume contain oxygen, neon and methane respectively at the same temperature and pressure. The correct increasing order of their rate of diffusion is
 (A) $A < B < C$ (B) $B < C < A$
 (C) $C < A < B$ (D) $C < B < A$

Comprehension-2 for Q. No. 19 to 20

A change in which two or more substance (reactants) combine to produce one or more new substance (products) that has/ have different chemical properties than the reactant is called chemical change. Change in which only physical properties of any substances get changed and no new substance is formed is called a physical change. Such as shape, size, colour and state, is known as physical change. A physical change is mostly reversible and during physical change no new substance are formed.

19. Which of the following statements is not correct?
 (A) In a chemical change, colour of the object may change
 (B) In a chemical change, heat will always be released
 (C) A chemical change always involves physical state
 (D) Rusting of iron becomes faster when humidity is high
20. Which of the following is a chemical change?
 (A) Foul smell comes when food gets spoiled
 (B) Pollution of air due to explosion of fire-work
 (C) Change in colour of a cut apple if left outside
 (D) All of the above

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

$(-5, -10)$, $(-15, 15)$, $(5, 5)$ are the coordinates of vertices A, B and C respectively of $\triangle ABC$, and P is a point on median AD such that $AP : PD = 2 : 3$

21. The coordinates of point D is
 (A) $(5, 10)$ (B) $(-5, -10)$
 (C) $(5, -10)$ (D) $(-5, 10)$
22. The coordinates of point P is
 (A) $(-5, -2)$ (B) $\left(\frac{10}{3}, 5\right)$
 (C) $\left(\frac{10}{3}, \frac{5}{3}\right)$ (D) None of these

Comprehension-2 for Q. No. 23 to 24

Let A and B be two given points whose co-ordinates are given by $A(x_1, y_1)$ and $B(x_2, y_2)$ respectively. Then $AB = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$ and mid-point of AB is $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$.

23. If $(9, a)$ is at the distance of 5 units from the point $(a, 2)$, then the value of a is
 (A) 6 (B) 3
 (C) 4 (D) 7
24. The perimeter of a triangle with vertices $(0, 4)$, $(0, 0)$ and $(3, 0)$ is
 (A) 10 (B) 12
 (C) 14 (D) 16

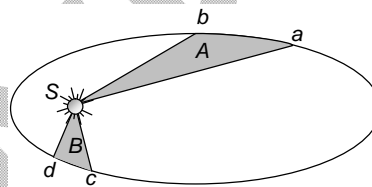
Section – II

Time: 90 Minutes

PHYSICS – (PART – A)

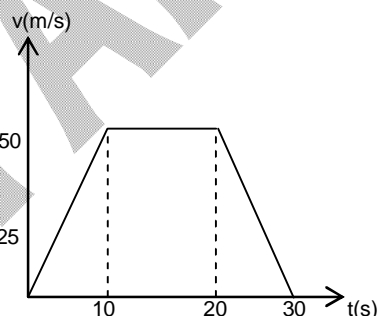
This part contains 3 Multiple Choice Questions number 25 to 27. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

25. The figure shows the motion of a planet around the sun in an elliptical orbit with sun at the focus. The shaded areas A and B are also shown in the figure which can be assumed to be equal. If t_1 and t_2 represent the time for the planet to move from a to b and d to c respectively, then



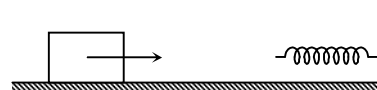
- (A) $t_1 < t_2$ (B) $t_1 > t_2$
(C) $t_1 = t_2$ (D) $t_1 \leq t_2$

26. Figure shows velocity time graph for a particle in rectilinear motion. Find the displacement covered by the object in thirty seconds



- (A) 500 m
(B) 750 m
(C) 650 m
(D) 1000 m

27. A 1 kg block moves towards a light spring with a velocity of 8 m/s. When the spring is compressed by 3 m, its momentum becomes half of the original momentum. Spring constant of the spring is



- (A) $18/3$ N/m (B) $16/3$ N/m
(C) 3 N/m (D) 8 N/m

CHEMISTRY – (PART – B)

This part contains 3 Multiple Choice Questions number 28 to 30. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

28. Aerosols cannot be destabilized by
(A) applying electric field of a high voltage.
(B) by spraying dry ice on super cooled aerosols
(C) by throwing electrified sand or fumes of AgI.
(D) by spraying conc. solutions of non hygroscopic substances on clouds.
29. The normality of 4.9% $\left(\frac{w}{w}\right)$ H_2SO_4 solution having density 1.02g/ml is
(A) 1.02N (B) 0.51N
(C) 2.04N (D) 4.9N

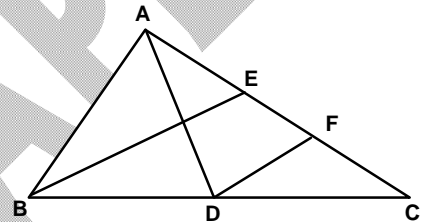
30. The crystalline salt $\text{Na}_2\text{SO}_4 \cdot \text{XH}_2\text{O}$ heating loses 55.9% of its mass and becomes anhydrous. The formula of crystalline salt is
 (A) $\text{Na}_2\text{SO}_4 \cdot 5\text{H}_2\text{O}$ (B) $\text{Na}_2\text{SO}_4 \cdot 7\text{H}_2\text{O}$
 (C) $\text{Na}_2\text{SO}_4 \cdot 2\text{H}_2\text{O}$ (D) $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$

MATHEMATICS – (PART – C)

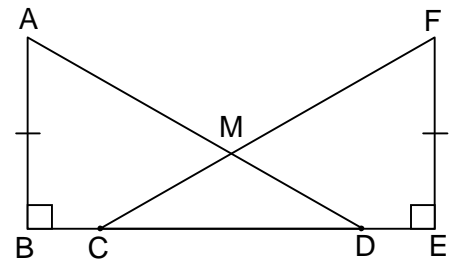
This part contains 3 Multiple Choice Questions number 31 to 33. Each question has 4 choices (A), (B), (C) and (D), out of which ONLY ONE is correct.

31. A field is in the form of a right triangle with hypotenuse 37m and one side 12m, then its area is
 (A) 225m^2 (B) 180m^2
 (C) 210m^2 (D) 240m^2

32. AD and BE are the medians of $\triangle ABC$ and $DF \parallel BE$ and $CF = x$ then AC
 (A) x (B) 4x
 (C) 3x (D) 2x



33. In the given figure, $AB \perp BE$ and $EF \perp BE$. Also $BC = DE$ and $AB = EF$. Then
 (A) $\triangle ABD \cong \triangle FEC$
 (B) $\triangle ABD \cong \triangle EFC$
 (C) $\triangle ABD \cong \triangle CMD$
 (D) $\triangle ABD \cong \triangle CEF$

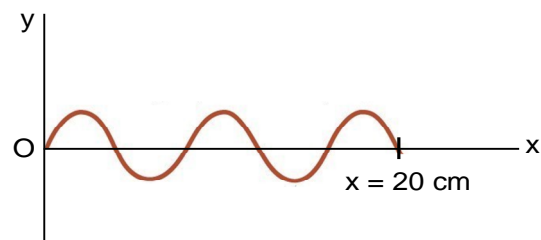


PHYSICS – (PART – D)

This part contains 2 Multiple Choice Multi Correct Type Questions number 34 to 35. Each question has 4 choices (A), (B), (C) and (D), out of which ONE OR MORE THAN ONE is/are correct.

34. In which of the following cases is the potential energy of a spring maximum?
 (A) When it is compressed by 10 cm (B) When it is extended by 10 cm
 (C) When it is at its natural length (D) none of these

35. For the wave shown in figure, the frequency and wavelength, if its speed is 320 m/sec, are:
 (A) 8 cm (B) 80 cm
 (C) 4000 Hz (D) 8000 Hz



CHEMISTRY – (PART – E)

This part contains 2 Multiple Choice Multi Correct Type Questions number 36 to 37. Each question has 4 choices (A), (B), (C) and (D), out of which ONE OR MORE THAN ONE is/are correct.

36. Which of the following relation(s) is/are incorrect?
- (A) $PM = DRT$ (B) $\frac{P}{M} = DRT$
 (C) $P + M = DRT$ (D) $P - M = DRT$
37. Which graph(s) is/are a straight line for an ideal gas?
- (A) V versus T (n and p constant) (B) T versus p (n and V constant)
 (C) p versus $1/V$ (n and T constant) (D) n versus $1/p$ (V and T constant)

MATHEMATICS – (PART – F)

This part contains 2 Multiple Choice Multi Correct Type Questions number 38 to 39. Each question has 4 choices (A), (B), (C) and (D), out of which ONE OR MORE THAN ONE is/are correct.

38. The value(s) which satisfies $|5x| - 4 = 21$ is/are
- (A) 5 (B) -5
 (C) $\frac{4}{5}$ (D) None of these
39. If $a+b+c=0$, then the value of $\frac{a^2}{bc} + \frac{b^2}{ca} + \frac{c^2}{ab}$ is –
- (A) 1 (B) $\ln 1$
 (C) $\ln e^3$ (D) 3

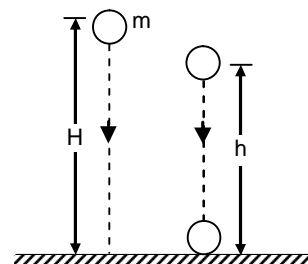
PHYSICS – (PART – G)

This part contains TWO (02) comprehensions. Based on each comprehension, there are THREE (03) 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. 40 to 42

A ball of mass m is dropped from a height H above a level floor as shown in figure. After striking the ground it bounces off back and reaches up to height h .

Based on above information, answer the following questions:



40. Change in momentum of the ball on striking is
 (A) $\sqrt{2g} m(\sqrt{H} + \sqrt{h})$ (B) $\sqrt{2g} m(\sqrt{H} - \sqrt{h})$
 (C) $m\sqrt{2g(H-h)}$ (D) None of these
41. Loss in energy just before and after striking is
 (A) mgh (B) mgH
 (C) $mg(H-h)$ (D) zero
42. Difference in potential energy at the highest points of both situations is
 (A) mgH (B) $mg(H+h)$
 (C) $mg(H-h)$ (D) Zero

Comprehension-2 for Q. No. 43 to 45

Two boys (at ground) simultaneously aim their guns at a bird sitting on a tower. The first boy releases his shot with speed of $100\sqrt{2}$ m/s at an angle 45° with the horizontal. The second boy is behind the first boy by a distance $100(\sqrt{3}-1)$ m and releases his shot with speed 200 m/s. Both the shots hit the bird simultaneously.

43. Angle of projection of the shot fired by the second boy is
 (A) $\frac{\pi}{6}$ (B) $\frac{\pi}{3}$
 (C) $\frac{\pi}{4}$ (D) none of these
44. After what time shots hit the bird
 (A) 1.5 s (B) 2 s
 (C) 1s (D) none of these
45. What would be the time of flight for first shot if there were no targets to hit?
 (A) 10 sec (B) 20 sec
 (C) 5 sec (D) 12 sec

CHEMISTRY - (PART - H)

This part contains **TWO (02)** comprehensions. Based on each comprehension, there are **THREE (03)** 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. 46 to 48

The clouds consists of charge particles of water dispersed in air. Some of them are +vely charged, others are -vely charged. When similar charged clouds come closer they cause lightening and thundering whereas, when +ve and -ve charge clouds some closer they cause heavy rain by aggregation of minute particles. It is possible to cause artificial rain by throwing electrified sand or silver iodide from an aeroplane and thus coagulating the mist hanging in air

46. Clouds are colloidal dispersions of:
 (A) water in air (B) Air in water
 (C) Air in solid (D) Solid in air

47. The dispersion of liquid or solid in air is called
 (A) aerosol (B) foam
 (C) gels (D) sol
48. Which of the following is not aerosol
 (A) Mist (B) Fog
 (C) Automobile exhaust (D) Foam

Comprehension-2 for Q. No. 49 to 51

To calculate the number of atoms first step is to calculate the number of moles. If the mass of an element/compound is given then divided the given mass by the molar mass of the element/compound to find the number of moles. In 1 mole of a substance, the number of atoms is N_A or 6.023×10^{23} atoms.

49. Which has maximum number of atoms?
 (A) 24 g of C (B) 56 g of Fe
 (C) 27g of Al (D) 108 g of Ag
50. Which of the following has the largest number of molecules?
 (A) 1 mol He (B) 22.4 L CO_2 at STP
 (C) 180 g glucose (D) All are equal
51. Which among the following is the mass of two molecules of water?
 (A) 5.98×10^{-23} g (B) 36 g
 (C) 18 g (D) 36×10^{-23} g

MATHEMATICS – (PART – I)

This part contains TWO (02) comprehensions. Based on each comprehension, there are THREE (03) 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. 52 to 54

If α, β are zeroes of polynomial $p(x) = ax^2 + bx + c$, then $\alpha + \beta = -\frac{b}{a}$ and $\alpha\beta = \frac{c}{a}$

If α and β are the zeros of the quadratic polynomial $p(y) = 5y^2 - 7y + 1$

52. Find the value of $\frac{1}{\alpha} + \frac{1}{\beta}$.
 (A) 7 (B) -7
 (C) 3 (D) -8
53. Find the value of $\alpha^2 + \beta^2$.
 (A) $-\frac{39}{25}$ (B) $\frac{29}{35}$
 (C) $\frac{59}{25}$ (D) none of these

54. Find the value of $\alpha^3 + \beta^3$.
- | | |
|-----------------------|-----------------------|
| (A) $\frac{226}{125}$ | (B) $\frac{238}{125}$ |
| (C) $\frac{239}{125}$ | (D) $\frac{237}{125}$ |

Comprehension-2 for Q. No. 55 to 57

$f(x) = a_0 + a_1 x + a_2 x^2 + \dots + a_n x^n$ is divided by $(x-k)$, then remainder is $f(k)$.

55. The remainder when x^{2014} is divided by $x^2 - 1$
- | | |
|-------------|-------------|
| (A) 1 | (B) -1 |
| (C) $x + 1$ | (D) $x - 1$ |
56. The remainder when x^{2014} is divided by $x^2 - 3x + 2$ is
- | | |
|--|--|
| (A) 2014 | (B) $2014x - 2013$ |
| (C) $(2^{2014} - 2)x + (2 - 2^{2014})$ | (D) $(2^{2014} - 1)x + (2 - 2^{2014})$ |
57. What is the remainder when $x^{2014} + 1$ is divided by x^3 ?
- | | |
|--------|-------------------|
| (A) -1 | (B) 1 |
| (C) 0 | (D) None of these |

FIITJEE

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SAMPLE PAPER

For Students of Class X

Paper 3

JEE Main & JEE Advanced

Paper Code: 910-3

ANSWER KEY

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|-----|---------|-----|------|-----|------|-----|---------|
| 1. | D | 2. | D | 3. | A | 4. | C |
| 5. | D | 6. | D | 7. | C | 8. | B |
| 9. | A | 10. | B | 11. | C | 12. | D |
| 13. | C | 14. | C | 15. | A | 16. | A |
| 17. | B | 18. | A | 19. | B | 20. | D |
| 21. | D | 22. | A | 23. | A | 24. | B |
| 25. | C | 26. | D | 27. | B | 28. | B |
| 29. | A | 30. | D | 31. | C | 32. | B |
| 33. | A | 34. | A, B | 35. | A, C | 36. | B, C, D |
| 37. | A, B, C | 38. | A, B | 39. | C, D | 40. | A |
| 41. | C | 42. | C | 43. | A | 44. | C |
| 45. | B | 46. | A | 47. | A | 48. | D |
| 49. | A | 50. | D | 51. | A | 52. | A |
| 53. | D | 54. | B | 55. | A | 56. | D |
| 57. | B | | | | | | |