FIITJEE

ALL INDIA TEST SERIES

JEE (Advanced)-2025

FULL TEST – XI

PAPER –2

TEST DATE: 11-05-2025

Time Allotted: 3 Hours **Maximum Marks: 180**

General Instructions:

- The test consists of total 51 questions.
- Each subject (PCM) has 17 questions.
- This question paper contains **Three Parts.**
- **Part-I** is Physics, **Part-II** is Chemistry and **Part-III** is Mathematics.
- Each **Part** is further divided into **Three Sections**: **Section-A, Section-B & Section-C**.
  Section – A *(01 – 04, 18 – 21, 35 – 38):* This section contains **TWELVE (12)** questions. Each question has **FOUR** options. **ONLY ONE** of these four options is the correct answer.
  Section – A *(05 –07, 22 – 24, 39 – 41):* This section contains **NINE (09)** questions. Each question has **FOUR** options. **ONE OR MORE THAN ONE** of these four option(s) is(are) correct answer(s).
  Section – B *(08 – 13, 25 – 30, 42 – 47):* This section contains **EIGHTEEN (18)** numerical based questions. The answer to each question is a **NON-NEGATIVE INTEGER VALUE**.
  Section – C *(14 –17, 31 – 34, 48 – 51):* This section contains **SIX (06) paragraphs.** Based on each paragraph, there are **TWO (02)** questions of numerical answer type. The answer to each question is a **NUMERICAL VALUE (XXXXX.XX).** If the numerical value has more than two decimal places, truncate/round-off the value to **TWO** decimal places.

MARKING SCHEME

Section – A (Single Correct): Answer to each question will be evaluated according to the following marking scheme:

Full Marks	:	+3	If ONLY the correct option is chosen.
Zero Marks	:	0	If none of the options is chosen (i.e. the question is unanswered);
Negative Marks	:	–1	In all other cases.

Section – A (One or More than One Correct): Answer to each question will be evaluated according to the following marking scheme:

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 and 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 – B: Answer to each question will be evaluated according to the following marking scheme:

Full Marks	:	+4	If ONLY the correct integer is entered;
Zero Marks	:	0	Question is unanswered;
Negative Marks	:	0	In all other cases.

Section – C: Answer to each question will be evaluated according to the following marking scheme:

Full Marks	:	+3	If ONLY the correct integer is entered;
Zero Marks	:	0	Question is unanswered;
Negative Marks	:	0	In all other cases.

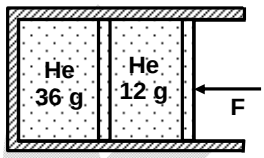
Physics

PART – I

SECTION – A
(One Options Correct Type)

*This section contains **FOUR (04)** questions. Each question has **FOUR** options (A), (B), (C) and (D). **ONLY ONE** of these four options is the correct answer.*

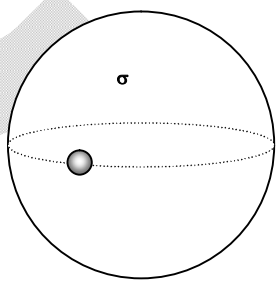
1. An ideal He gas is trapped in a cylinder closed at left end and is divided into two parts by a stationary heat conducting wall to the right of wall is movable piston. The piston and walls of the cylinder cannot conduct heat. Mass of the gas in left and right parts is 36g and 12g respectively. What is the molar specific heat of the gas in the right side of the cylinder for this process? (R = universal gas constant)



(A) $\frac{9R}{2}$ (B) $-\frac{9R}{2}$

(C) $\frac{R}{2}$ (D) $-\frac{R}{2}$

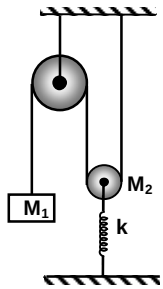
2. A spherical **non-conducting** shell of uniform charge density σ has a small circular hole cut out of it as shown in the figure. What is magnitude of the electric field just outside the sphere, directly above the centre of the circular hole?



(A) $\frac{2\sigma}{\varepsilon_0}$ (B) $\frac{\sigma}{\varepsilon_0}$

(C) $\frac{\sigma}{2\varepsilon_0}$ (D) $\frac{\sigma}{4\varepsilon_0}$

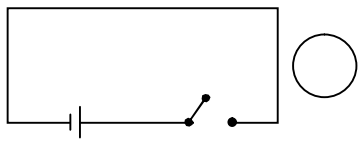
3. Find the period of the free oscillations of M_1 if mass M_1 is slightly pulled down and released. Force constant of the spring is k, fixed pulley is massless and the smooth movable pulley has mass M_2.



(A) $T = 2\pi\sqrt{\frac{M_1+M_2}{k}}$ (B) $T = 2\pi\sqrt{\frac{M_1+4M_2}{k}}$

(C) $T = 2\pi\sqrt{\frac{4M_1+M_2}{k}}$ (D) $T = 2\pi\sqrt{\frac{3M_1+M_2}{k}}$

4. Consider the situation as shown in figure.
If the switch is closed and after some time it is open again, the closed circuit loop will show



(A) A clockwise current pulse then anticlockwise current pulse.
(B) An anticlockwise current pulse then a clockwise current pulse;
(C) An anticlockwise current pulse then no current then a clockwise current pulse;
(D) A clockwise current pulse then no current then an anticlockwise current pulse;

SECTION – A

(One or More than one correct type)

*This section contains **THREE (03)** questions. Each question has **FOUR** options (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option(s) is (are) correct answer(s).*

5. A current I_0 enters into a parallel combination of resistors R_1 and R_2. Current I_1 flows through R_1 and I_2 through R_2. The current I_0 distributes in such a way that
(A) Power consumed in R_1 and in R_2 is the same.
(B) Power consumed in R_1 and R_2 is such that $\frac{P_1}{P_2} = \frac{R_2}{R_1}$, where P_1 and P_2 are the power consumed in R_1 and R_2 respectively.
(C) I_1 is proportional to R_2 and I_2 is proportional to R_1.
(D) Potential difference across R_1 and R_2 are same.

6. In figure-1 is shown acoustic pressure variation with distance in a harmonic sound wave travelling in the positive x-direction. Period of the sound wave is 8 sec. Figure-1 was recorded at t = 10 sec. In figure -2 are shown variation in acoustic pressure by two curves recorded at two successive instants of time $t = t_1$ and then $t = t_2$. Both the figures are drawn at the same scale.

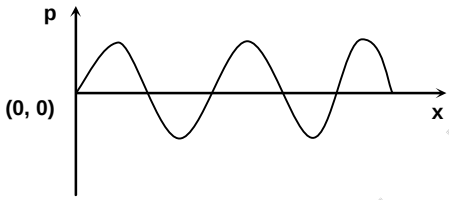


Figure-1

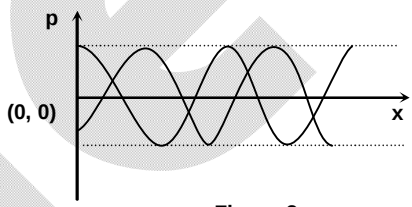


Figure-2

Which of the following sets correctly express possible values of the instants t_1 and t_2?
(A) $t_1 = 0$ sec and $t_2 = 3$ sec
(B) $t_1 = 11$ sec and $t_2 = 16$ sec
(C) $t_1 = 8$ sec and $t_2 = 11$ sec
(D) $t_1 = 16$ sec and $t_2 = 19$ sec

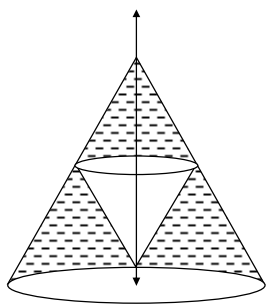
7. The pitch of a screw gauge is 1 mm and there are 50 division on its circular scale. When nothing is put in between jaws, the zero of the circular scale lies 3 divisions below the reference line. When a wire is placed between the jaws, 2 linear divisions are clearly visible while 31 divisions on circular scale coincide with the reference line. Choose the correct alternative (s).
(A) The instrument has positive zero error and its lease count is 0.02 mm.
(B) The instrument has a negative zero error and its least count is 0.02 mm.
(C) The actual reading of the diameter of the wire is 2.68 mm.
(D) The actual reading of the diameter of the wire is 2.56 mm.

SECTION – B

(Numerical Answer Type)

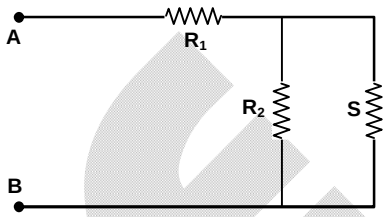
*This section contains **SIX (06)** Numerical based questions. The answer to each question is a **NON-NEGATIVE INTEGER VALUE**.*

8. An inverted cone of height h is scooped out of a uniform cone of radius 2h and height 2h symmetrically as shown in the figure. If moment of inertia of the removed portion about the axis shown is I and the moment of inertia of the remaining portion is λI. Find the value of λ.

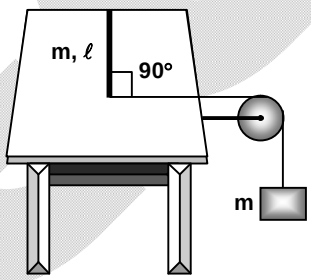


9. A particle having charge 'q' and mass 'm' is projected with velocity $(4\hat{i}-6\hat{j}+3\hat{k})$ m/sec from the origin in a region occupied by electric field 'E' and magnetic field 'B' such that $\vec{B}=B_0\hat{j}$ and $\vec{E}=E_0\hat{j}$ (take $\frac{qE_0}{m}=2$). Find the time (in sec) when the magnitude of velocity of the charge particle becomes $5\sqrt{5}$ m/sec. (neglect the gravity)

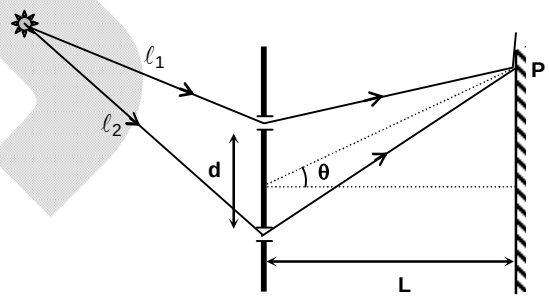
10. As shown in figure, circuit has resistance R_1 = 10 Ω and R_2 = 15 Ω. At what value of the resistance S connected in parallel to R_2 will the thermal power absorbed by S be independent of very small variation in S itself? The voltage between the points A and B is constant.



11. There is a rod of length ℓ, mass m lying on a fixed horizontal table. A cord is led through a pulley, and its horizontal part is attached to one end of the rod, while its vertical part is attached to a block of mass m_1. Assume pulley and the cord is ideal. The maximum possible acceleration of the rod's centre of mass C (for all possible values of masses m and m_1) at the moment of releasing the block m_1 is $\frac{g}{n}$. Find the value of n.



12. In a young experiment, the light source is at a distance ℓ_1 = 2m and ℓ_2 = 2.2 m from the slits. The wavelength is λ = 500nm and the distance between the slits is d = 2000nm. The distance of the screen from the slits is L, and L >> d. How many maxima will appear on the screen (including the maximas at infinity)?



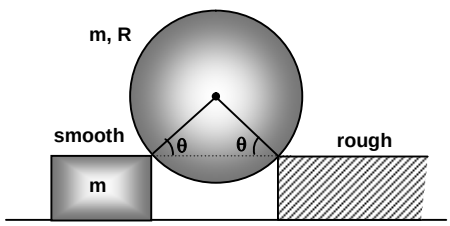
13. The motion of a point like mass can be split into two parts. In the first part its average speed is v_1 = 90 km/hr and in the second its average speed is v_2 = 40 km/hr. For the whole motion the average speed is the geometric mean of the speed v_1 and v_2 that is v_3 = 60 km/hr Then the ratio of the covered distance in the first part and the second part is k. Find the value of 100k.

SECTION – C
(Numerical Answer Type)

*This section contains **TWO (02) paragraphs.** Based on each paragraph, there are **TWO (02)** questions of numerical answer type. The answer to each question is a **NUMERICAL VALUE (XXXXX.XX).** If the numerical value has more than two decimal places, truncate/round-off the value to **TWO** decimal places.*

Paragraph for Question Nos. 14 and 15

A solid cylinder of mass m = 5 kg rests on two supports of same height as shown. One support is rough and stationary while other is a smooth plank of same mass m = 5 kg placed on a smooth horizontal surface. Initially θ = 37° and there is no slipping between the cylinder and stationary support. The system is released from rest. Now answer the following questions (take g = 9.8 m/s^2)

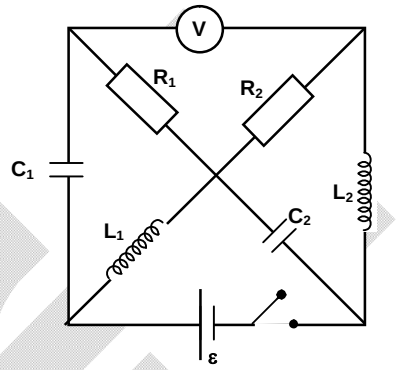


14. The acceleration of cylinder just after release is $\frac{k}{3}$ m/s^2. Find the value of k.

15. The normal force acting between the cylinder and the plank just after release is k newton. Find the value of k.

Paragraph for Question Nos. 16 and 17

For the circuit shown in Figure, $R_1 = 3\Omega$, $R_2 = 1\Omega$, $C_1 = C_2 = 2F$, and $L_1 = L_2 = L = 2H$. The electromotive force of the battery is ε = 1Volt. Initially the switch is closed and the system is operating in a stationary regime (steady state).



16. The reading of the voltmeter in the stationary regime is ……

17. The total amount of heat (in Joules) which will be dissipated on each of the resistors after opening the switch, and until a new equilibrium state is achieved is ……

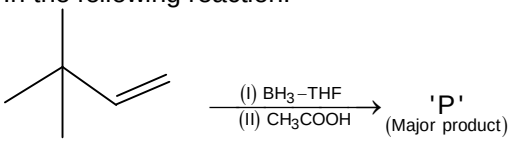
Chemistry

PART – II

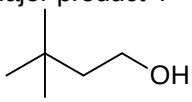
SECTION – A
(One Options Correct Type)

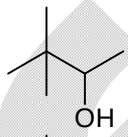
*This section contains **FOUR (04)** questions. Each question has **FOUR** options (A), (B), (C) and (D). **ONLY ONE** of these four options is the correct answer.*

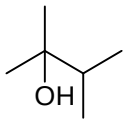
18. In the following reaction:

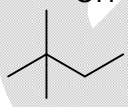


The major product 'P" is:

(A) 

(B) 

(C) 

(D) 

19. Sodium nitroprusside when reacts with sodium sulphide solution produces

(A) $Na_4\left[Fe(NH_3)_4NO\right]$ (B) $Na_2\left[Fe(CN)_5NO\right]$

(C) $Na_2\left[Fe(CN)_6NOS\right]$ (D) $Na_4\left[Fe(CN)_5NOS\right]$

20. Which of the following statement is incorrect?
(A) Neoprene is a polymer of isoprene
(B) Glyptal is a copolymer of ethylene glycol and phthalic acid
(C) Nylon-6,6 is a condensation polymer
(D) Buna-S is copolymer of 1,3-Butadiene and styrene

21. The incorrect statement related to the compounds of phosphorous is
(A) Phosphine when passed through $CuSO_4$ solution red precipitate is formed.
(B) PCl_5 in the solid sate exist as $\left[PCl_4^+\right]\left[PCl_6^-\right]$
(C) In the solid state PBr_5 exists as $\left[PBr_4^+\right]Br^-$
(D) PCl_3 on hydrolysis produces H_3PO_3

SECTION – A
(One or More than one correct type)

*This section contains **THREE (03)** questions. Each question has **FOUR** options (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option(s) is (are) correct answer(s).*

22. Select the correct match for refining process
(A) Electrolytic refining for Zinc
(B) Vapour phase refining for Nickel
(C) Zone refining for Gallium
(D) Vapour phase refining for Titanium

23. The incorrect statement (s) among the following statements is/are
(A) Lactose on hydrolysis produces D-Glucose and D-Mannose
(B) Sucrose undergoes mutarotation
(C) Maltose is a reducing sugar
(D) D-Glucose and D-Mannose are C-4 epimers

24. A glass tube AD of uniform cross section of length 100 cm contains two columns of ideal gas AB and CD, respectively, a column of mercury of length 20 cm. When the tube is horizontal, AB = 20 cm and CD = 60 cm. When the tube held vertically with the end A up, the mercury column moves down 10 cm.
Which of the following statement is correct for the tube?
(A) the pressure of both the columns, when the tube was in horizontal position, is 37.5 cm Hg
(B) only D end is open
(C) both the ends are open
(D) both the ends are closed

SECTION – B

(Numerical Answer Type)

*This section contains **SIX (06)** Numerical based questions. The answer to each question is a **NON-NEGATIVE INTEGER VALUE**.*

25. 320 ml of $\frac{M}{10}KMnO_4$ solution in acidic medium when titrated required 112 ml of H_2O_2 solution. The volume strength of H_2O_2 solution is …….vol.

26. 1 mol of PCl_3 is dissolved in excess of water. Number of moles of NaOH which are required to neutralize this solution is

27. Equal masses of CH_4 and SO_2 were taken at 800 K and 400 K respectively. The ratio of their kinetic energies were found to be x : 1. The value of x is

28. 2.73 gram of $CoCl_3.6H_2O$ (molar mass 273 gm/mol) was dissolved in 100 gram water (freezing point 0^oC). The freezing point of solution was found to be -0.744^oC. K_f of water is 1.86 K kg mol^{-1}. If complete ionsation occurred, then the number of H_2O molecules in the coordination sphere of the compound $CoCl_3.6H_2O$ is

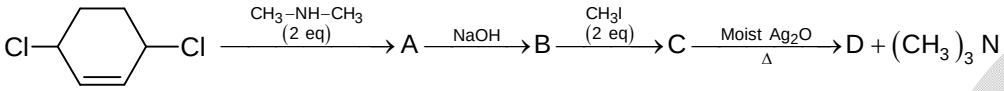
29. How many moles of $NaClO_3$ will be obtained when 9 moles of Cl_2 reacts completely with excess of hot and concentrated NaOH solution?

30. In a closed flask at 400 K NH_2COONH_4 (s) was taken. After some time a constant pressure of 3 bar was found in the flask. K_P for the reaction

SECTION – C
(Numerical Answer Type)

*This section contains **TWO (02) paragraphs.** Based on each paragraph, there are **TWO (02)** questions of numerical answer type. The answer to each question is a **NUMERICAL VALUE (XXXXX.XX).** If the numerical value has more than two decimal places, truncate/round-off the value to **TWO** decimal places.*

Paragraph for Question Nos. 31 and 32



For the above reaction sequence $x = \frac{\text{Molecular wt. of D}}{0.5}$ and

$y = \frac{[2n+2]-[\text{number of hydrogens in D}]}{2}$

Here n = number of carbon atoms in D.

31. The value of x is_____?

32. What is the value of y_____?

Paragraph for Question Nos. 33 and 34

$Cl_2C=CCl_2$, SO_2, DDT, Pb, O_3, PAN, NO, CF_2Cl_2, CO_2, CH_4

Here, $x = \text{number of soil pollutants} \times \text{number of water pollutants}$

$y = \frac{\text{number of stratospheric pollutants}}{2}$

33. What is the value of x_____?

34. What is the value of y_____?

Mathematics

PART – III

SECTION – A
(One Options Correct Type)

*This section contains **FOUR (04)** questions. Each question has **FOUR** options (A), (B), (C) and (D). **ONLY ONE** of these four options is the correct answer.*

35. Let $x_1 = \sqrt[7]{2} + \sqrt[7]{8}$, $x_2 = \sqrt[7]{3} + \sqrt[7]{7}$ and $x_3 = \sqrt[7]{4} + \sqrt[7]{6}$, then
(A) $x_1 > x_2 > x_3$ (B) $x_1 < x_2 < x_3$
(C) $x_1 + x_3 < 2x_2$ (D) $x_1 + x_3 > 2x_2$

36. In a triangle ABC with sides a, b and c a semicircle touching the sides AC and BC is inscribed whose diameter lies on AB, then the radius of the semicircle is
(A) $\frac{a}{2}$ (B) $\frac{2abc}{s(a+b)}\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$
(C) $\frac{2\Delta}{a+b}$ (D) $\frac{2abc}{s(a+b)}\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

37. If $\int_0^\infty e^{-x^2}dx = a$, then $\int_0^\infty \frac{e^{-Jx}}{\sqrt{x}}dx$ where J > 0 is
(A) $2a\sqrt{J}$ (B) $\frac{a}{\sqrt{J}}$
(C) $a\sqrt{J}$ (D) $\frac{2a}{\sqrt{J}}$

38. Let A and B are two non singular matrices such that $B \neq I$, $A^5 = I$ and $AB^2 = BA$, then the least value of n for which $B^n = I$ is
(A) 63 (B) 64
(C) 31 (D) 32

SECTION – A
(One or More than one correct type)

*This section contains **THREE (03)** questions. Each question has **FOUR** options (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option(s) is (are) correct answer(s).*

39. Two functions f(x) and g(x) are defined as $f(x) = \begin{cases} [x]^{\{x\}} & , x \neq 0 \\ 0 & , x = 0 \end{cases}$ and $g(x) = \begin{cases} \{x\}^{[x]} & , x \neq 0 \\ 0 & , x = 0 \end{cases}$, (where [.] and {.} refer to the greatest integer function and the fractional part function respectively). Then which of the following statements is/are true (where $n \in N$)
(A) $\int_0^{n+1} f(x)dx - \int_0^n f(x)dx = \frac{n-1}{\ln n}$
(B) $\int_0^{n+1} g(x)dx - \int_0^n g(x)dx = \frac{1}{n+1}$
(C) $\int_0^t f(x)dx = \int_0^t g(x)dx$ has at least one solution in $t \in \left(0, \frac{\pi}{2}\right)$
(D) $e < \lim_{n\to\infty} \int_0^n g(x)dx < e^2$

40. Consider $f(x) = \sin^{-1}(\sin x) - \cos^{-1}(\cos x)$, then which of the following statements is/are true

(A) $f(x) = 0$ for $x \in \left(0, \frac{\pi}{4}\right)$ (B) $f(x) < 0$ for $x \in \left(\frac{\pi}{2}, \frac{3\pi}{4}\right)$

(C) $f(x) > 0$ for $x \in \left(\pi, \frac{5\pi}{4}\right)$ (D) $f(x) < 0$ for $x \in \left(-\pi, \frac{-3\pi}{4}\right)$

41. An equilateral triangle is constructed such that the origin is one of its vertices while the other two vertices lie on the line $\frac{x-3}{2} = \frac{y-2}{3} = z-2$, then which of the following statements is/are correct

(A) area of the equilateral triangle is $\sqrt{3}$

(B) inradius of the equilateral triangle is $\frac{1}{\sqrt{3}}$

(C) circumradius of the equilateral triangle is $\frac{2}{\sqrt{3}}$

(D) centroid of the equilateral triangle is $\left(\frac{2}{\sqrt{3}}, \frac{-2}{\sqrt{3}}, \frac{2}{\sqrt{3}}\right)$

SECTION – B

(Numerical Answer Type)

*This section contains **SIX (06)** Numerical based questions. The answer to each question is a **NON-NEGATIVE INTEGER VALUE**.*

42. In a given circle if n chords are drawn, where $n \geq 2$, such that no three chords are concurrent inside the circle and m is the number of points of intersection of the chords inside the circle, then the number of line segments obtained by dividing the chords through these m points of intersection is f(n, m). Then $\left[\frac{f(8,8)}{f(6,3)}\right]$ is equal to (where [.] denotes the greatest integer function)

43. The area enclosed by the curve $(x^2 + y^2)^3 = 16x^2$ is equal to

44. Let C be the curve $\left|z + \frac{2}{z}\right| = 2$ on the Argand plane. If a and b represent the maximum and minimum modulus of the complex numbers on C, then $a^2 + b^2$ is equal to

45. If $I_n = \int_0^{\pi/2} \cos^n x \cos nx\,dx$, then $\sqrt{\frac{I_4}{I_8}}$ is equal to

46. The minimum distance of the curve $|z - (2 + 4i)| - |z - (2 - 4i)| = 6$ from the point $2 + i$ in the Argand plane is equal to

47. If $\frac{\left(1^4 + \frac{1}{4}\right)\left(3^4 + \frac{1}{4}\right).....\left((2n-1)^4 + \frac{1}{4}\right)}{\left(2^4 + \frac{1}{4}\right)\left(4^4 + \frac{1}{4}\right).....\left((2n)^4 + \frac{1}{4}\right)} = \frac{1}{k_1 n^2 + k_2 n + k_3}$, then $k_1 - k_2 + k_3$ equal to

SECTION – C
(Numerical Answer Type)

*This section contains **TWO (02) paragraphs.** Based on each paragraph, there are **TWO (02)** questions of numerical answer type. The answer to each question is a **NUMERICAL VALUE (XXXXX.XX).** If the numerical value has more than two decimal places, truncate/round-off the value to **TWO** decimal places.*

Paragraph for Question Nos. 48 and 49

Let P(x) be a polynomial with real coefficient such that $(x^2 + x + 1)\,P(x-1) = (x^2 - x + 1)\,P(x)\ \forall\ x \in R$ and $P(1) = 3$

48. If $\int_0^1 \tan^{-1}\left(\frac{2x}{1+P(x^2)}\right)dx + \int_0^1 \tan^{-1}(x+1)\,dx = \frac{k}{16}(\pi - \ln 4)$ then value of k is

49. Let $I_n = \int_0^1 \{P(x^2) + P(x^2-1)\}^n dx$. If $(k+1)\,I_n = 2k\,(1 + I_{n-1})$, then the value of n is $(k, n \in N)$

Paragraph for Question Nos. 50 and 51

A line passing through A(–1, –1) intersects the parabola $y^2 = 4x$ at P and Q. Focus of parabola is S(1, 0) (Where [.] denotes the greatest integer function)

50. If Q is $\left(\frac{9}{4}, 3\right)$ and equation of bisector of angle PSQ is $y = mx + c$ then $[m^2 + c^2]$ is equal to

51. Let PP′ be the latus rectum, QQ′ be a focal chord (P′ and Q′ lie on the parabola). The point of intersection of PQ′ and P′Q is $B(\alpha, \beta)$ then $[\alpha^2 + \beta^2]$ is equal to $(\beta > 2)$