

JEE Main April 2025
Question Paper With Text Solution
03 April | Shift-1

PHYSICS



JEE Main & Advanced | XI-XII Foundation | VI-X Pre-Foundation

Office : Piprali Road, Sikar (Raj.) | Ph. 01572-241911
Website : www.matrixedu.in ; Email : smd@matrixacademy.co.in

**JEE MAIN APRIL 2025 | 03ND APRIL SHIFT-1****SECTION – A**

26. The radii of curvature for a thin convex lens are 10 cm and 15 cm respectively. The focal length of the lens is 12 cm. the refractive index of the lens material is:

(1) 1.5 (2) 1.2 (3) 1.8 (4) 1.4

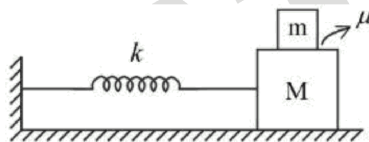
Question ID : 347577567

Ans. Official answer NTA (4)

Sol.

27. Two blocks of masses m and M , ($M > m$), are placed on a frictionless table as shown in figure. A massless spring with spring constant k is attached with the lower block. If the system is slightly displaced and released, then:

(μ = coefficient of friction between the two blocks)



(A) The time period of small oscillation of the two blocks is $T = 2\pi\sqrt{\frac{(m+M)}{k}}$

(B) The acceleration of the blocks is $a = -\frac{kx}{M+m}$

(x = displacement of the blocks from the mean position)

(C) The magnitude of the frictional force on the upper block is $\frac{m\mu |x|}{M+m}$

(D) The maximum amplitude of the upper block, if it does not slip, is $\frac{\mu(M+m)g}{k}$

(E) Maximum frictional force can be $\mu(M+m)g$.

Choose the correct answer from the options given below:

(1) A, B, C only (2) A, B, D only (3) B, C, D only (4) C, D, E only

Question ID : 347577561

Ans. Official answer NTA (2)

Sol.



28. A wire of length 25 m and cross-sectional area 5 mm^2 having resistivity of $2 \times 10^{-6} \Omega \text{ m}$ is bent into a complete circle. The resistance between diametrically opposite points will be :

- (1) 50Ω (2) 12.5Ω (3) 100Ω (4) 25Ω

Question ID : 347577562

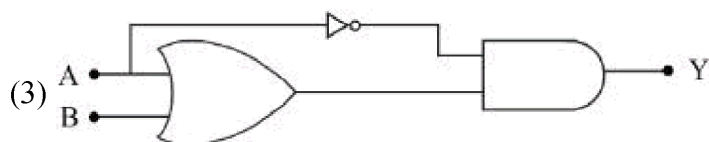
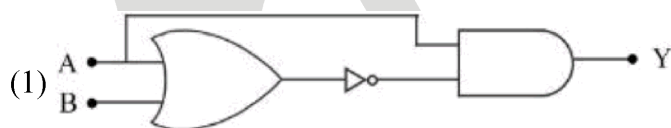
Ans. Official answer NTA (4)

Ans. Matrix answer (Bonus)

Sol.

29. Choose the correct logic circuit for the given truth table having inputs A and B.

Inputs		Output
A	B	Y
0	0	0
0	1	0
1	0	1
1	1	1





Question ID : 347577570

Ans. Official answer NTA (4)**Sol.**

30. A gas is kept in a container having walls which are thermally non-conducting. Initially the gas has a volume of 800 cm^3 and temperature 27°C . The change in temperature when the gas is adiabatically compressed to 200 cm^3 is :

(Take $\gamma = 1.5$, γ is the ratio of specific heats at constant pressure and at constant volume)

- (1) 327 K (2) 300 K (3) 522 K (4) 600 K

Question ID : 347577559

Ans. Official answer NTA (2)**Sol.**

31. Consider following statements for refraction of light through prism, when angle of deviation is minimum.

- A. The refracted ray inside prism becomes parallel to the base.
- B. Larger angle prisms provide smaller angle of minimum deviation.
- C. Angle of incidence and angle of emergence becomes equal.
- D. There are always two sets of angle of incidence for which deviation will be same except at minimum deviation setting.
- E. Angle of refraction becomes double of prism angle.

Choose the correct answer from the options given below:

- (1) B, D and E only (2) A, C and D only (3) A, B and E only (4) B, C and D only

Question ID : 347577566

Ans. Official answer NTA (2)**Sol.**

32. The work function of a metal is 3 eV. The color of the visible light that is required to cause emission of photoelectrons is:

- (1) Yellow (2) Blue (3) Red (4) Green

Question ID : 347577568

Ans. Official answer NTA (2)**Sol.**

33. Consider a completely full cylindrical water tank of height 1.6 m and of cross-sectional area 0.5 m^2 . It has a small hole in its side at a height 90 cm from the bottom. Assume, the cross-sectional area of the hole to be negligibly small as compared to that of the water tank. If a load 50 kg is applied at the top surface of the water



in the tank then the velocity of the water coming out at the instant when the hole is opened is :

($g = 10 \text{ m/s}^2$)

(1) 2 m/s

(2) 5 m/s

(3) 3 m/s

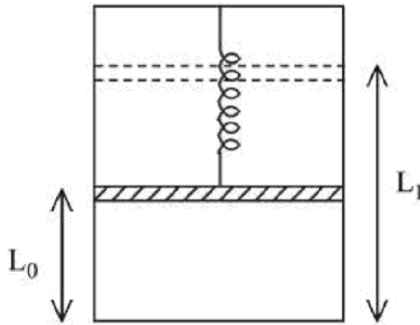
(4) 4 m/s

Question ID : 347577557

Ans. Official answer NTA (4)

Sol.

34.



A piston of mass M is hung from a massless spring whose restoring force law goes as $F = -kx^3$, where k is the spring constant of appropriate dimension. The piston separates the vertical chamber into two parts, where the bottom part is filled with ' n ' moles of an ideal gas. An external work is done on the gas isothermally (at a constant temperature T) with the help of a heating filament (with negligible volume) mounted in lower part of the chamber, so that the piston goes up from a height L_0 to L_1 , the total energy delivered by the filament is:

(Assume spring to be in its natural length before heating)

$$(1) nRT \ln \left(\frac{L_1^2}{L_0^2} \right) + \frac{Mg}{2} (L_1 - L_0) + \frac{k}{4} (L_1^4 - L_0^4)$$

$$(2) 3nRT \ln \left(\frac{L_1}{L_0} \right) + 2Mg (L_1 - L_0) + \frac{k}{3} (L_1^3 - L_0^3)$$

$$(3) nRT \ln \left(\frac{L_1}{L_0} \right) + Mg (L_1 - L_0) + \frac{3k}{4} (L_1^4 - L_0^4)$$

$$(4) nRT \ln \left(\frac{L_1}{L_0} \right) + Mg (L_1 - L_0) + \frac{k}{4} (L_1^4 - L_0^4)$$

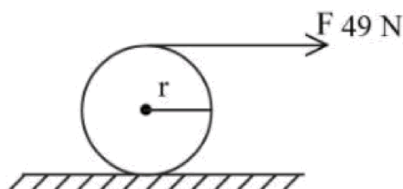
Question ID : 347577560

Ans. Official answer NTA (4)

Ans. Matrix answer (Bonus)

Sol.

35. A force of 49 N acts tangentially at the highest point of a sphere (solid) of mass 20 kg, kept on a rough horizontal plane. If the sphere rolls without slipping, then the acceleration of the center of the sphere is:

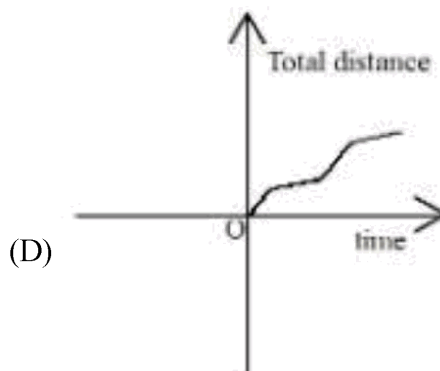
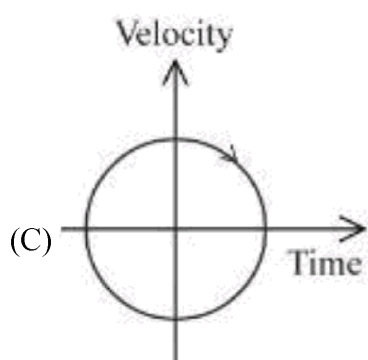
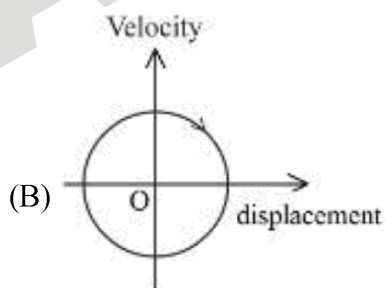
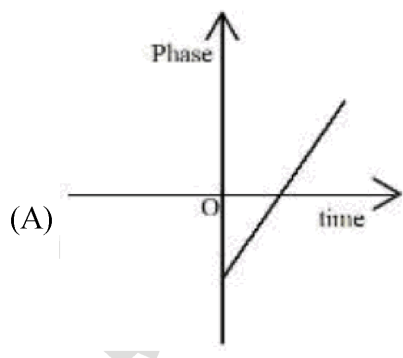


- (1) 2.5 m/s^2 (2) 3.5 m/s^2 (3) 0.35 m/s^2 (4) 0.25 m/s^2

Question ID : 347577556

Ans. Official answer NTA (2)

36. Which of the following curves possibly represent one-dimensional motion of a particle ?



- (1) A, C and D only (2) A, B and D only (3) A and B only (4) A, B and C only

MATRIX JEE ACADEMY

Office : Piprali Road, Sikar (Raj.) | Ph. 01572-241911

Website : www.matrixedu.in ; Email : smd@matrixacademy.co.in



Question ID : 347577555

Ans. Official answer NTA (2)**Sol.**

37. The radiation pressure exerted by a 450 W light source on a perfectly reflecting surface placed at 2 m away from it, is :

- (1) 0 (2) 6×10^{-8} Pascals (3) 1.5×10^{-8} Pascals (4) 3×10^{-8} Pascals

Question ID : 347577565

Ans. Official answer NTA (2)**Sol.**

38. Match the List-I with List-II :

LIST-I		LIST-II	
A.	${}_0^1\text{n} + {}_{92}^{235}\text{U} \rightarrow {}_{54}^{140}\text{Xe} + {}_{38}^{94}\text{Sr} + 2{}_0^1\text{n}$	I.	Chemical reaction
B.	$2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$	II.	Fusion with +ve Q value
C.	${}_1^2\text{H} + {}_1^2\text{H} \rightarrow {}_2^3\text{He} + {}_0^1\text{n}$	III.	Fission
D.	${}_1^1\text{H} + {}_1^3\text{H} \rightarrow {}_1^2\text{H} + {}_1^2\text{H}$	IV.	Fusion with -ve Q value

Choose the correct answer from the options given below:

- (1) A-III, B-I, C-II, D-IV (2) A-III, B-I, C-IV, D-II
 (3) A-II, B-I, C-III, D-IV (4) A-II, B-I, C-IV, D-III

Question ID : 347577569

Ans. Official answer NTA (1)**Sol.**

39. A particle is released from height S above the surface of the earth. At certain height its kinetic energy is three times its potential energy. The height from the surface of the earth and the speed of the particle at that instant are respectively.

- (1) $\frac{S}{4}, \frac{3gS}{2}$ (2) $\frac{S}{2}, \frac{3gS}{2}$ (3) $\frac{S}{4}, \sqrt{\frac{3gS}{2}}$ (4) $\frac{S}{2}, \sqrt{\frac{3gS}{2}}$



Question ID : 347577553

Ans. Official answer NTA (3)**Sol.**

40. During the melting of a slab of ice at 273 K at atmospheric pressure :

- (1) Internal energy of the ice-water system decreases.
- (2) Positive work is done on the ice-water system by the atmosphere.
- (3) Internal energy of ice-water system remains unchanged.
- (4) Positive work is done by the ice-water system on the atmosphere.

Question ID : 347577558

Ans. Official answer NTA (2)**Sol.**

41. Match the List-I with List-II:

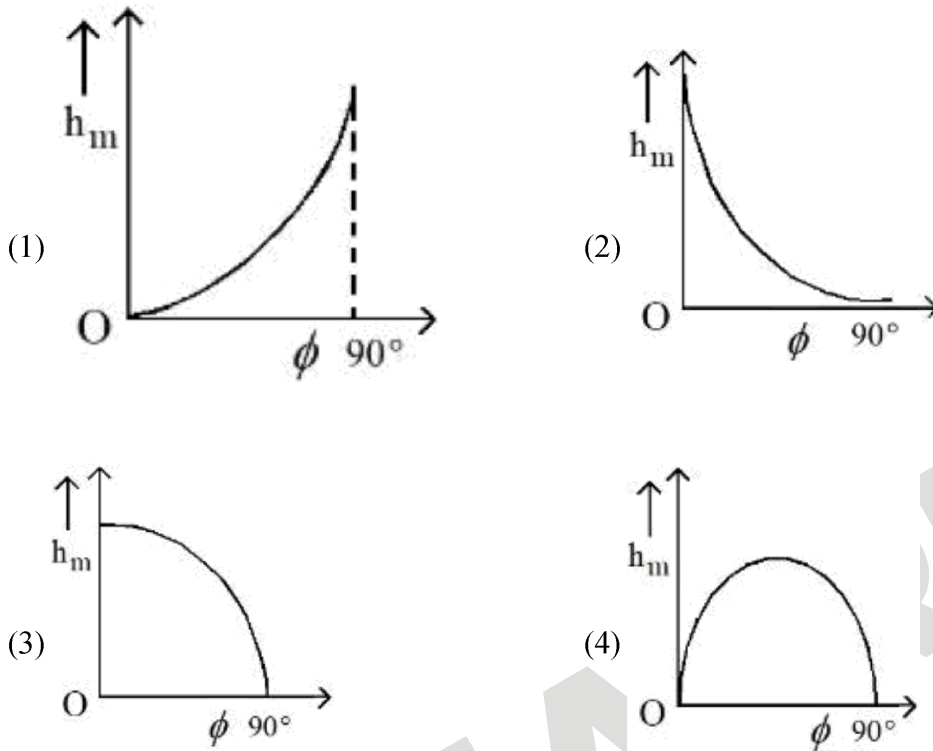
LIST-I		LIST-II	
A.	Gravitational constant	I.	$[LT^{-2}]$
B.	Gravitational potential energy	II.	$[L^2T^{-2}]$
C.	Gravitational potential	III.	$[ML^2T^{-2}]$
D.	Acceleration due to gravity	IV.	$[M^{-1}L^3T^{-2}]$

Choose the correct answer from the options given below:

- (1) A-I, B-II, C-IV, D-II
- (2) A-III, B-II, C-I, D-IV
- (3) A-II, B-IV, C-III, D-I
- (4) A-IV, B-III, C-II, D-I

Question ID : 347577552

Ans. Official answer NTA (4)**Sol.**42. The angle of projection of a particle is measured from the vertical axis as ϕ and the maximum height reached by the particle is h_m . Here h_m as function of ϕ can be presented as:



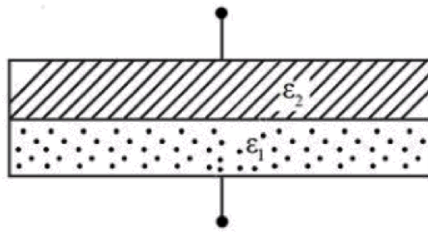
Question ID : 347577554

Ans. Official answer NTA (3)**Sol.**

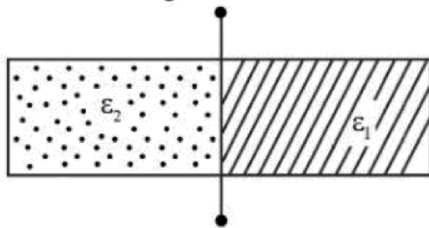
43. A parallel plate capacitor is filled equally (half) with two dielectrics of dielectric constants ϵ_1 and ϵ_2 , as shown in figures. The distance between the plates is d and area of each plate is A . If capacitance in first configuration and second configuration are C_1 and C_2 respectively, then $\frac{C_1}{C_2}$ is :



First Configuration



Second Configuration



(1) $\frac{4\epsilon_1\epsilon_2}{(\epsilon_1 + \epsilon_2)^2}$

(2) $\frac{\epsilon_0(\epsilon_1 + \epsilon_2)}{2}$

(3) $\frac{\epsilon_1\epsilon_2^2}{(\epsilon_1 + \epsilon_2)^2}$

(4) $\frac{\epsilon_1\epsilon_2}{\epsilon_1 + \epsilon_2}$

Question ID : 347577563

Ans. Official answer NTA (1)**Sol.**

44. A person measures mass of 3 different particles as 435.42 g, 226.3 g and 0.125 g. According to the rules for arithmetic operations with significant figures, the addition of the masses of 3 particles will be.

(1) 662 g

(2) 661.8 g

(3) 661.845 g

(4) 661.84 g

Question ID : 347577551

Ans. Official answer NTA (2)**Sol.**

45. The electrostatic potential on the surface of uniformly charged spherical shell of radius $R = 10$ cm is 120 V. The potential at the centre of shell, at a distance $r = 5$ cm from centre, and at a distance $r = 15$ cm from the centre of the shell respectively, are :

(1) 40 V, 40 V, 80 V (2) 120 V, 120 V, 80 V (3) 0 V, 0 V, 80 V (4) 0 V, 120 V, 40 V

Question ID : 347577564

Ans. Official answer NTA (2)**Sol.****MATRIX JEE ACADEMY**

Office : Piprali Road, Sikar (Raj.) | Ph. 01572-241911

Website : www.matrixedu.in ; Email : smd@matrixacademy.co.in

**SECTION - B**

46. Two coherent monochromatic light beams of intensities $4I$ and $9I$ are superimposed. The difference between the maximum and minimum intensities in the resulting interference pattern is xI . The value of x is _____.

Question ID : 347577575

Ans. Official answer NTA (24)

Sol.

47. A 4.0 cm long straight wire carrying a current of 8 A is placed perpendicular to a uniform magnetic field of strength 0.15 T. The magnetic force on the wire is _____ mN.

Question ID : 347577572

Ans. Official answer NTA (48)

Sol.

48. Three identical spheres of mass m , are placed at the vertices of an equilateral triangle of length a . When released, they interact only through gravitational force and collide after a time $T = 4$ seconds. If the sides of the triangle are increased to length $2a$ and also the masses of the spheres are made $2m$, then they will collide after _____ seconds.

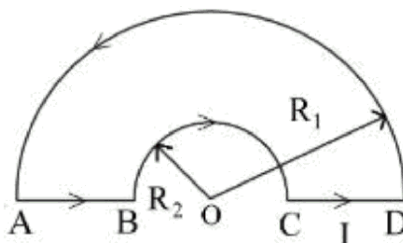
Question ID : 347577571

Ans. Official answer NTA (8)

Sol.

49. A loop ABCDA, carrying current $I = 12$ A, is placed in a plane, consists of two semi-circular segments of radius $R_1 = 6\pi$ m and $R_2 = 4\pi$ m. The magnitude of the resultant magnetic field at centre O is $k \times 10^{-7}$ T. The value of k is _____.

(Given $\mu_0 = 4\pi \times 10^{-7} \text{ Tm A}^{-1}$)



Question ID : 347577573

Ans. Official answer NTA (1)

Sol.

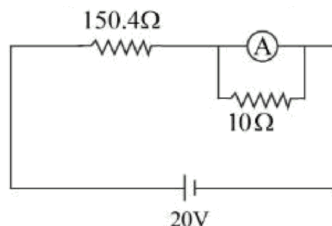
MATRIX JEE ACADEMY

Office : Piprali Road, Sikar (Raj.) | Ph. 01572-241911

Website : www.matrixedu.in ; Email : smd@matrixacademy.co.in



50. In the figure shown below, a resistance of $150.4\ \Omega$ is connected in series to an ammeter A of resistance $240\ \Omega$. A shunt resistance of $10\ \Omega$ is connected in parallel with the ammeter. The reading of the ammeter is _____ MA.



Ans. Official answer NTA (125)

Sol.