JEE Main April 2024

Question Paper With Text Solution

05 April | Shift-2

PHYSICS

31.   The vehicles carrying inflammable fluids usually have metallic chains touching the ground :

(1) To alert other vehicles

(2) To protect tyres from catching dirt from ground

(3) To conduct excess charge due to air friction to ground and prevent sparking

(4) It is a custom

Question ID: 87827055737

Ans.   Official Answer NTA (3)

Sol.

32.   A body is moving unidirectionally under the influence of a constant power source. Its displacement in time t is proportional to :

(1) t^2 (2) t   (3) $t^3/2$ (4) $t^2/3$

Question ID: 87827055732

Ans.   Official Answer NTA (3)

Sol.

33.   A galvanometer of resistance $100\,\Omega$ when connected in series with $400\,\Omega$ measures a voltage of upto 10V. The value of resistance required to convert the galvanometer into ammeter to read upto 10A is $x \times 10^{-2}\,\Omega$. The value of x is :

(1) 2   (2) 200   (3) 800   (4) 20

Question ID: 87827055743

Ans.   Official Answer NTA (4)

Sol.

34.   Which of the following statement is not true about stopping potential (V_0) ?

(1) It increases with increase in intensity of the incident light.

(2) It depends upon frequency of the incident light.

(3) It depends on the nature of emitter material.

(4) It is 1/e times the maximum kinetic energy of electrons emitted.

Question ID: 87827055744

Ans.   Official Answer NTA (1)

Sol.

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35. The electrostatic force $\left(\vec{F}_1\right)$ and magnetic force $\left(\vec{F}_2\right)$ acting on a charge q moving with velocity v can be written :

(1) $\vec{F}_1 = q\vec{B}, \vec{F}_2 = q\left(\vec{B} \times \vec{V}\right)$

(2) $\vec{F}_1 = q\vec{V}.\vec{E}, \vec{F}_2 = q\left(\vec{B}.\vec{V}\right)$

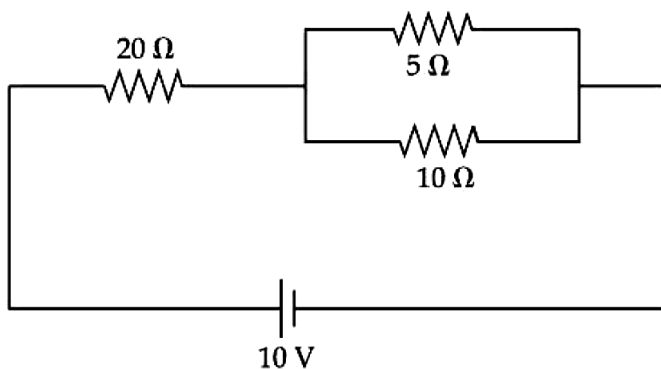(3) $\vec{F}_1 = q\vec{E}, \vec{F}_2 = q\left(\vec{B} \times \vec{V}\right)$

(4) $\vec{F}_1 = q\vec{E}, \vec{F}_2 = q\left(\vec{V} \times \vec{B}\right)$

Question ID: 87827055740

Ans.   Official Answer NTA (4)

Sol.

36. The ratio of heat dissipated per second through the resitance $5\,\Omega$ and $10\,\Omega$ in the circuit given below is :

(1) 1 : 1   (2) 2 : 1   (3) 4 : 1   (4) 1 : 2

Question ID: 87827055739

Ans.   Official Answer NTA (2)

Sol.

37. Given below are two statements :

Statement I : When the white light passed through a prism, the red light bends lesser than yellow and violet.

Statement II : The refractive indices are different from different wavelengths is dispersive medium, In the light of the above statements, choose the correct answer from the options given below :

(1) Statement I is true but Statement II is false   (2) Both Statement I and Statement II are false

(3) Statement I is false but Statement II is true   (4) Both Statement I and Statement II are true

Question ID: 87827055742

Ans.   Official Answer NTA (4)

Sol.

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

   List - I

   (A) A force that restores an elastic body of unit area to its original state

   (B) Two equal and opposite forces parallel to opposite faces

   (C) Forces perpendicular everywhere to the surface per unit area same everywhere

   (D) Two equal and opposite forces perpendicular to opposite faces

   List - II

   (I) Bulk modulus

   (II) Young's modulus

   (III) Stress

   (IV) Shear modulus

   Choose the *correct* answer from the options given below :

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

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

Question ID: 87827055735

Ans.   Official Answer NTA (3)

Sol.

39. A vernier callipers has 20 divisions on the vaernier scale, which coincides with 19th division on the main scale. The least count of the instrument is 0.1 mm. One main scale division is equal to _____ mm.

   (1) 2   (2) 0.5   (3) 1   (4) 5

Question ID: 87827055733

Ans.   Official Answer NTA (1)

Sol.

40. The angular momentum of an electron in a hydrogen atom is proportional to :

   (Where r is the radius of orbit of electron)

   (1) $\dfrac{1}{r}$ (2) $\dfrac{1}{\sqrt{r}}$ (3) $\sqrt{r}$ (4) r

Question ID: 87827055745

Ans.   Official Answer NTA (3)

Sol.

41. A heavy box of mass 50 kg is moving on a horizontal surface. If co-efficient of kinetic friction between the box and horizontal surface is 0.3 then force of kinetic friction is :

   (1) 1470 N   (2) 1.47 N   (3) 147 N   (4) 14.7 N

Question ID: 87827055730

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Ans.   Official Answer NTA (3)

Sol.

42.   If n is the number density and d is the diameter of the molecule, then the average distance covered by a molecule between two successive collisions (i.e. mean free path) is represented by :

(1) $\dfrac{1}{\sqrt{2}\,n\pi d^2}$ (2) $\dfrac{1}{\sqrt{2n\pi d^2}}$ (3) $\dfrac{1}{\sqrt{2}\,n^2\pi^2 d^2}$ (4) $\sqrt{2}\,n\pi\,d^2$

Question ID: 87827055736

Ans.   Official Answer NTA (1)

Sol.

43.   A series LCR circuit is subjected to an ac signal of 200 V, 50 Hz. If the voltage across the inductor (L = 10 mH) is 31.4 V, then the current in this circuit is _____ .

(1) 68 A   (2) 10 A   (3) 10 mA   (4) 63 A

Question ID: 87827055738

Ans.   Official Answer NTA (2)

Sol.

44.   A particle moves in x-y plane under the influence of a force $\vec{F}$ such that its linear momentum is $\vec{p}(t) = \hat{i}\cos(kt) - \hat{j}\sin(kt)$. If k is constant, the angle between $\vec{F}$ and $\vec{p}$ will be :

(1) $\dfrac{\pi}{3}$ (2) $\dfrac{\pi}{4}$ (3) $\dfrac{\pi}{6}$ (4) $\dfrac{\pi}{2}$

Question ID: 87827055731

Ans.   Official Answer NTA (4)

Sol.

45.   A man carrying a monkey on his shoulder does cycling smoothly on a circular track of radius 9m and completes 120 resolutions in 3 minutes. The magnitude of centripetal acceleration of moneky is (in m/s²) :

(1) Zero   (2) $4\pi^2 ms^{-2}$ (3) $57600\,\pi^2 ms^{-2}$ (4) $16\,\pi^2 ms^{-2}$

Question ID: 87827055729

Ans.   Official Answer NTA (4)

Sol.

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46. A satellite revolving around a plante in stationary orbit has time period 6 hourse. The mass of planet is one-fourth the mass of earth. The radius orbit of planet is :

(Given = Radius of geo-stationary orbit for earch is $4.2 \times 10^4 \, km$)

(1) $1.68 \times 10^5 \, km$ (2) $8.4 \times 10^4 \, km$ (3) $1.4 \times 10^4 \, km$ (4) $1.05 \times 10^4 \, km$

Question ID: 87827055734

Ans.   Official Answer NTA (4)

Sol.

47. What is the dimensional formula of ab^{-1} in the equation $\left(P + \dfrac{a}{V^2} \right)(V - b) = RT$, where letters have their usual meaning.

(1) $\left[ML^2T^{-2} \right]$ (2) $\left[M^0L^3T^{-2} \right]$ (3) $\left[M^{-1}L^5T^3 \right]$ (4) $\left[M^6L^7T^4 \right]$

Question ID: 87827055728

Ans.   Official Answer NTA (1)

Sol.

48. During an adiabatic process, if the pressure of a gas is found to be proportional to the cube of its absolute temperature, then the ratio of $\dfrac{C_P}{C_V}$ for the gas is :

(1) $\dfrac{9}{7}$ (2) $\dfrac{5}{3}$ (3) $\dfrac{3}{2}$ (4) $\dfrac{7}{5}$

Question ID: 87827055746

Ans.   Official Answer NTA (3)

Sol.

49. Match List - I with List - II

List - I EM Waves	List - II Wave length Range
(A) Infra-red	(I) $< 10^{-3}$ nm
(B) Ultraviolet	(II) 400 nm to 1 nm
(C) X-rays	(III) 1 mm to 700 nm
(D) Gamma rays	(IV) 1 nm to 10^{-3} nm

Choose the correct answer from the options given below :

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

(3) (A)-(II), (B)-(I), (C)-(IV), (D)-(III) (4) (A)-(IV), (B)-(III), (C)-(II), (D)-(I)
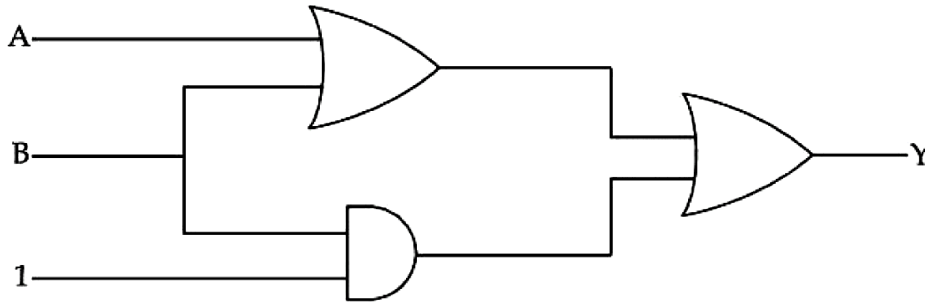
Question ID: 87827055741

Ans.   Official Answer NTA (2)

Sol.

50.   The output (Y) of logic circuit given below is 0 only when :

       (1) A = 0, B = 0   (2) A = 1, B = 1   (3) A = 1, B = 0   (4) A = 0, B = 1

Question ID: 87827055747

Ans.   Official Answer NTA (1)

Sol.

51.   The shortest wavelength of the spectral lines in the Lyman series of hydrogen spectrum is $915 \, \overset{\circ}{A}$. The longest wavelength of spectral lines in the Balmer series will be _____ $\overset{\circ}{A}$.

Question ID: 87827055757

Ans.   Official Answer NTA (6588)

Sol.
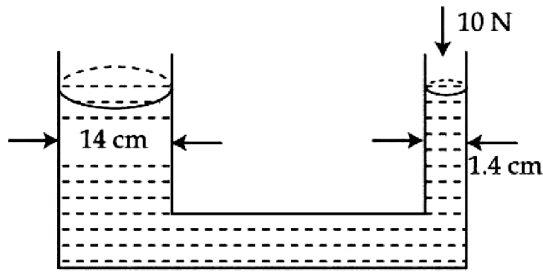
52.   The maximum height reaches by a projectile is 64 m. If the initial velocity is halved, the new maximum height of the projectile is _____ m.

Question ID: 87827055748

Ans.   Official Answer NTA (16)

Sol.

53.   A hydraulic press containing water has two arms with diameters as mentioned in the figure. A force of 10 N is applied on the surface of water in the thinner arm. The force required to be applied on the surface of water in the thicker arm to maintain equilibrium of water is _____ N.

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Question ID: 87827055751

Ans. Official Answer NTA (1000)

Sol.

54. A wire of resistance $20\,\Omega$ is divided into 10 equal parts, resulting pairs. A combination of two parts are connected in parallel and so on. Now resulting pairs of parallel combination are connected in series. The equivalent resistance of final combination is _____ Ω.
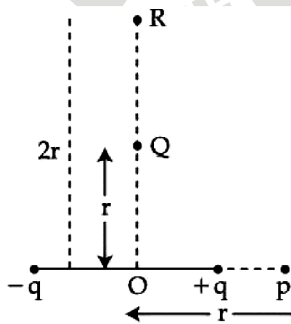
Question ID: 87827055753

Ans. Official Answer NTA (5)

Sol.

55. The electric field at point p due to an electric dipole is E. The electric field at point R on equitorial line will be $\dfrac{E}{x}$. The value of x :

Question ID: 87827055755

Ans. Official Answer NTA (16)

Sol.

56. A hollow sphere is rolling on a plane surface about its axis of symmetry. The ratio of rotational kinetic energy to its total kinetic energy is $\dfrac{x}{5}$. The value of x is _____ .

Question ID: 87827055749

Ans.   Official Answer NTA (2)

Sol.

57.   A sponometer wire of resonating length 90 cm has a fundamental frequency of 400 Hz when kept under some tension. The resonating lenth of the wire with fndamental frequency of 600 Hz under same tension _____ cm.

Question ID: 87827055752

Ans.   Official Answer NTA (60)

Sol.

58.   The current in an inductor is given by I = (3t + 8) where t is in second. The magnitude of induced emf produced in the inductor is 12 mV. The self-inductance of the inductor _____ mH.

Question ID: 87827055756

Ans.   Official Answer NTA (4)

Sol.

59.   A solenoid of length 0.5 m has a radius of 1 cm and is made up of 'm' number of turns. It carries a current of 5A. If the magnitude of the magnetic field inside the solenoid is $6.28 \times 10^{-3}\,\text{T}$ then the value of m is _____ .

Question ID: 87827055754

Ans.   Official Answer NTA (500)

Sol.

60.   In a single slit experiment, a parallel beam of green light of wavelength 550 nm passes through a slit of width 0.20 mm. The transmitted light is collected on a screen 100 cm away. The distance of first order minima from the central maximum will be $x \times 10^{-5}\,\text{m}$. The value of x is :

Question ID: 87827055750

Ans.   Official Answer NTA (275)

Sol.

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