PHYSICS

BOOKS - NIKITA PHYSICS (HINGLISH)

MHT-CET 2016

Circular Motion

1. In vertical circular motion, the ratio of kinetic energy of a particle at highest point to that at lowest point is

A. 5

B. 2

C. 0.5

D. 0.2

Answer: D

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2. Calculate the angular speed of the hour hand of a clock .

A. $\frac{1}{50}$

B. $\frac{1}{60}$

C. $\frac{1}{120}$

D. $\frac{1}{720}$

Answer: C

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3. A particle moves along a circle of radius r with constant tangential acceleration. If the velocity of the particle is v at the end of

second revolution, after the revolution has started, then the tangential acceleration is

A. $\frac{v^2}{8\pi r}$

B. $\frac{v^2}{6\pi r}$

C. $\frac{v^2}{4\pi r}$

D. $\frac{v^2}{2\pi r}$

Answer: A

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Gravitation

1. Two bodies of masses m and 4m are placed at a distance r. The gravitational potential at a point on the line joining them where the gravitational field is zero is:

A. $-\frac{4Gm}{r}$

B. $-\frac{8Gm}{r}$

C. $-\frac{16Gm}{r}$

D. $-\frac{32Gm}{r}$

Answer: C

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2. The value of gravitational accelerationg at a height h above the earth's surface is One forth the value of gravitational acceleration at surface ,then (R = radius of earth)

A. h=R

B. $= \frac{R}{2}$

C. $h = \frac{R}{3}$

D. $h = \frac{R}{4}$

Answer: A

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3. A ring and a disc roll on the horizontal surface without slipping, with same linear velocity. If bolh have same mass and radius and total kinetic energy of the ring is 4 J, then total kinetic energy of the disc is

A. 3J

B. 4J

C. 5J

D. 6J

Answer: A

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4. A disc of radius R and thickness R/6 has moment of inertia / about an axis passing through its centre and perpendicular to its plane. Disc is melted and recast into a solid

sphere. The moment of inertia of a sphere about its diameter is

A. $\frac{I}{5}$

B. $\frac{I}{6}$

C. $\frac{I}{32}$

D. $\frac{I}{64}$

Answer: A

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5. Let M be the mass and L be the length of a thin uniform rod. In first case, axis of rotation is passing through centre and perpendicular to the length of the rod. In second case, axis of rotation is passing through one end and perpendicular to the length of the rod. The ratio of radius of gyration in first case to second case is

A. 1

B. $\frac{1}{2}$

C. $\frac{1}{4}$

D. $\frac{1}{8}$

Answer: B

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Oscillations

1. When the observer moves towards the stationary source with velocity, v_1, the apparent frequency of emitted note is f_1. When the observer moves away from the

source with velocity v_1, the apparent frequency is f_2. If v is the velocity of sound in air and $\frac{f_1}{f_2} = 2$,then $\frac{v}{v_1} = ?$

A. 2

B. 3

C. 4

D. 5

Answer: B

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2. The bob of a simple pendulum performs SHM with period T in air and with period T_1 in water. Relation between T and T_1 is (neglect friction due to water, density of the material of the bob is = $\frac{9}{8} \times 10^3 \frac{kg}{m^3}$, density of water = $10^3 \frac{kg}{m^3}$)

A. $T_1 = 3T$

B. $T_1 = 2T$

C. $T_1 = T$

D. $T_1 = \frac{T}{2}$

Answer: A

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3. Which of the following quantity does not change due to damping of oscillations?

A. angular frequency

B. time period

C. initial phase

D. amplitude

Answer: C

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4. A simple pendulum of length l has a maximum angular displacement θ. The maximum kinetic energy of the bob of mass m will be

A. $mgl(1+\cos\theta)$

B. $mal\left(1+\cos^2\theta\right)$

C. $mgl(1-\cos\theta)$

D. $mgl(\cos\theta - 1)$

Answer: C

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5. A mass 'm_1m 1 ' connected to a horizontal spring performs S.H.M. with amplitude 'A'. While mass 'm_1m 1 ' is passing through mean position another mass 'm_2m 2 ' is placed on it so that both the masses move together with

amplitude 'A_1A 1 '. The ratio of \dfrac{A_1}{A} A

A 1 is (m_2 < m_1)(m 2

A. $\left[\frac{m}{m_1+m_2}\right]^{\frac{1}{2}}$

B. $\left[\frac{m_1+m_2}{m}\right]^{\frac{1}{2}}$

C. $\left[\frac{m_1}{m_1+m_2}\right]^{\frac{1}{2}}$

D. $\left[\frac{m_1+m_2}{m_2}\right]^{\frac{1}{2}}$

Answer: A

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Elasticity

1. Two wires having same length and material are stretched by same force. Their diameters are in the ratio 1:3. The ratio of strain energy per unit volume for these two wires (smaller to larger diameter) when stretched is

A. $3:1$

B. $9:1$

C. $27:1$

D. $81:1$

Answer: D

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2. Let a steel bar of length $'l'$, breadth 'b' and depth 'd' be loaded at the centre by a load 'W'. Then the sag of bending of beam is (Y=Young's modulus of material of steel)

A. $\frac{Wl^3}{2bd^3Y}$

B. $\frac{Wl^3}{4bd^3Y}$

C. $\frac{Wl^3}{2bd^3Y}$

D. $\frac{Wl^3}{4bd^2Y}$

Answer: B

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Sureact Tension

1. A glass rod of radius r_1 is inserted symmetrically into a vertical capillary tube of radius r_2 such that their lower ends are at the same level. The arrangement is now dipped in

water. The height to which water will rise into the tube will be ($\sigma =$ surface tension of water, $\rho =$ density of water)

A. $\frac{T}{(R+r)pg}$

B. $\frac{Rpg}{2T}$

C. $\frac{2T}{(R-r)pg}$

D. $\frac{(R-r)pg}{T}$

Answer: C

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2. A liquid drop having surface energy E is spread into 512 droplets of same size. The final surface energy of the droplets is

A. 2 E

B. 4E

C. 8E

D. 12 E

Answer: C

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Wave Motion

1. A progressive wave is represented by $y = 12\sin(5t - 4x)$ cm. On this wave, how far away are the two points having phase difference of 90° ?

A. $\frac{\pi}{2} cm$

B. $\frac{\pi}{4} cm$

C. $\frac{\pi}{8} cm$

D. $\frac{\pi}{16} cm$

Answer: C

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Stationary Waes

1. Wire having tension 225 N produces six beats per second when it is tuned with a fork. When tension changes to 256 N, it is tuned with the same fork, the number of beats remain unchanged. The frequency of the fork will be

A. 186 Hz

B. 225 Hz

C. 256 Hz

D. 280 Hz

Answer: A

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2. Two strings A and B made of same material are stretched by same tension. The radius of string A is double of the radius of B. A

transverse wave travels on A with speed v_A and on B with speed v_B. The ratio $\frac{v_A}{v_B}$ is

A. $\frac{1}{4}$

B. $\frac{1}{2}$

C. 2

D. 4

Answer: B

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3. When open pipe is closed from one end, then third overtone of closed pipe is higher in frequency by 150 Hz than second overtone of open pipe. The fundamental frequency of open end pipe will be

A. 75 Hz

B. 150 Hz

C. 225 Hz

D. 300 Hz

Answer: D

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4. If the end correction of an open pipe is 0.8 cm, then the inner radius of that pipe will be

A. $\frac{1}{3}cm$

B. $\frac{2}{3}cm,$

C. $\frac{3}{2}cm$

D. 0.2cm

Answer: B

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Kinetic Theory Of Gases Radiation

1. For a gas $\frac{R}{C_V}$ = 0.4, where R is the universal gas constant and C, is molar specific heat at constant volume. The gas is made up of molecules which are

A. rigid diatomic

B. monoatomic

C. non-rigid diatomic

D. polyatomic

Answer: A

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2. A black rectangular surface of area A emits energy E per second at $27^\circ C$. If length and breadth are reduced to one third of initial value and temperature is raised to $327^\circ C$, then energy emitted per second becomes

A. $\frac{4E}{9}$

B. $\frac{7E}{9}$

C. $\frac{10E}{9}$

D. $\frac{16E}{9}$

Answer: D

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3. Assuming the expression for the pressure exerted by the gas on the walls of the container, it can be shown that pressure is

A. $\left[\frac{1}{3}\right]^{rd}$ kinetic energy per unit volume of a gas

B. $\left[\frac{2}{3}\right]^{rd}$ kinetic energy per unit volume of a gas

C. $\left[\frac{3}{4}\right]^{th}$ kinetic energy per unit volume of a gas

D. $\frac{3}{2} \times$ kinetic energy per unit volume of a gas

Answer: B

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Wave Theory Of Light

1. A ray of light travelling through rarer medium is incident at very small angle i on a glass slab and after refraction its velocity is reduced by 20%. The angle of deviation

A. $\frac{i}{8}$

B. $\frac{i}{5}$

C. $\frac{i}{2}$

D. $\frac{4i}{5}$

Answer: B

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2. From Brewster's law, except for polished metallic surfaces, the polarising angle

A. depends on wavelength and is different for different colours

B. independent of wavelength and is different for different colours

C. independent of wavelength and is same for different colours

D. depends on wavelength and is same for different colours

Answer: A

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Interference And Diffraction

1. Interference fringes are produced on a screen by using two light sources of intensities / and 9/. The phase difference between the beams $\frac{\pi}{2}$ is at point P and πat point Q on the screen. The difference between the resultant intensities at point P and Q is

A. 2I

B. 4 I

C. 6 I

D. 8 I

Answer: C

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2. Two coherent sources P and Q produce interference at point A on the screen where there is a dark band which is formed between 4th bright band and 5th bright band. Wavelength of light used is 6000 Å. The path difference between PA and QA is

A. $1.4 \times 10^{-4} cm$

B. $2.7 \times 10^{-4} cm$

C. $4.5 \times 10^{-4} cm$

D. $6.2 \times 10^{-4} cm$

Answer: B

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3. Resolving power of telescope increases when

A. wavelength of light decreases

B. wavelength of light increases

C. focal length ot eye-piece increases

D. focal length of eye-piece decreases

Answer: A

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Electrostatics

1. Three parallel plate air capacitors are connected in parallel. Each capacitor has plate area $\frac{A}{3}$ and the separation between the plates is d, 2d and 3d respectively. The equivalent capacity of combination is (ε_0 = absolute permittivity of free space)

A. $\frac{7 \in_0 A}{18d}$

B. $\frac{11 \in_0 A}{18d}$

C. $\frac{13 \in_0 A}{18d}$

D. $\frac{17 \in_0 A}{18d}$

Answer: B

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2. Two identical parallel plate air capacitors are connected in series to a battery of emf V. If one of the capacitor is completely filled with dielectric material of constant K, then potential difference of the other capacitor will become

A. $\frac{K}{V(K+1)}$

B. $\frac{KV}{K+1}$

C. $\frac{K-1}{KV}$

D. $\frac{V}{K(K+1)}$

Answer: B

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3. The amount of work done in increasing the voltage across the plates of capacitor from 5 V to 10 V is W. The work done in increasing it from 10 V to 15 V will be

A. W

B. 0.6 W

C. 1.25 W

D. 1.67W

Answer: D

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Current Electricity

1. In potentiometer experiment, null point isobtained at a particular point for a cell on potentiometer wire x cm long. If the lengthof the potentiometer wire is increasedwithout changing the cell, the balancing length will (Driving source is not changed)

A. increase

B. decrease

C. not change

D. becomes zero

Answer: A

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2. In balanced meter bridge, the resistance of bridge wire is $0.1\Omega cm$. Unknown resistance X is connected in left gap and 6Ω in right gap, null point divides the wire in the ratio 2:3 . Find the current drawn the battery of 5V having negligible resistance

A. 1A

B. 1.5A

C. 2A

D. 5A

Answer: A

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Magnetic Effects Of Electric Current

1. A galvanometer of resistance 30Ω is connected to a battery of emf 2 V with 1970Ω

resistance in series. A full scale deflection of 20 divisions is obtained in the galvanometer. To reduce the deflection to 10 divisions, the resistance in series required is

A. 4030Ω

B. 4000Ω

C. 3970Ω

D. 2000Ω

Answer: C

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2. Two particles X and Y with equal charges, after being accelerated throuhg the same potential difference, enter a region of uniform magnetic field and describe circular paths of radii R_1 and R_2 respectively. The ratio of the mass of X to that of Y is

A. $\frac{r_1}{r_2}$

B. $\sqrt{\frac{r_1}{r_2}}$

C. $\left[\frac{r_2}{r_1}\right]^2$

D. $\left[\frac{r_1}{r_2}\right]$

Answer: D

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Magnetism

1. An iron rod is placed parallel to magnetic field of intensity $2000Am^{-1}$. The magnetic flux through the rod is 6×10^{-1} Wb and its cross-sectional area is $3cm^2$. The magnetic permeability of the rod in Wb $A^{-1}m^{-1}$ is

A. 10^{-1}

B. 10^{-2}

C. 10^{-3}

D. 10^{-4}

Answer: C

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2. The magnetic field (B) inside a long solenoid having n turns per unit length and carrying current / when iron core is kept in it is (μ_o =

permeability of vacuum, χ = magnetic susceptibility)

A. $\mu_0 nI(1-\chi)$

B. $\mu_0 nI\chi$

C. $\mu_0 nI^2(1+\chi)$

D. $\mu_0 nI(1+\chi)$

Answer: D

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Electromagnetic Induction

1. Alternating current of peak value $\left(\frac{2}{\pi}\right)$ ampere flows through the primary coil of the transformer. The coefficient of mutual inductance between primary and secondary coil is 1 henry. The peak e.m.f. induced in secondary coil is (Frequency of AC= 50 Hz)

A. 100 V

B. 200 V

C. 300 V

D. 400 V

Answer: B

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2. The L-C parallel resonant circuit

A. has a very high impedance

B. has a very high current

C. acts as resistance of very low value

D. has zero impedance

Answer: A

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3. Magnetic flux passing through a coil is initially 4×10^{-4} Wb. It reduces to 10% of its original value in t second. If the emf induced is 0.72 mV then t in second is

A. 0.3

B. 0.4

C. 0.5

D. 0.6

Answer: C

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Electrons And Photons

1. Light of wavelength A which is less than threshold wavelength is incident on a photosensitive material. If incident wavelength is decreased so that emitted photoelectrons are moving with same velocity, then stopping potential will

A. increase

B. decrease

C. be zero

D. become exactly half

Answer: A

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2. When light of wavelength λ is incident on photosensitive surface, the stopping potential is V. When light of wavelength 3λ is incident

on same surface, the stopping potential is $\frac{V}{6}$

Thereshould wave length for the surface is

A. 2λ

B. 3λ

C. 4λ

D. 5λ

Answer: D

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Atoms Molecules And Nuclei

1. An electron of mass m when accelerated through a potential difference V has de - Broglie wavelength λ. The de - Broglie wavelength associated with a proton of mass M accelerated through the same potential difference will be

A. $\frac{\lambda}{3}\sqrt{\frac{M}{m}}$

B. $\frac{\lambda}{3}.\frac{M}{m}$

C. $\frac{\lambda}{3}\sqrt{\frac{m}{M}}$

D. $\frac{\lambda}{3}.\frac{m}{M}$

Answer: C

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2. In Bohr's theory of hydrogen atom, the electron jumps from higher orbit n to lower orbit p. The wavelength will be minimum for the transition

A. n=5to p=4

B. n= 4 to p= 3

C. n=3 to p=2

D. n=2 to p=1

Answer: D

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3. When an electron in hydrogen atom revolves in stationary orbit, it

A. does not radiate light though its velocity changes

B. does not radiate light and velocity remains unchanged

C. radiates light but its velocity is unchanged

D. radiates light with change of energy

Answer: A

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Semiconductors

1. In an oscillator, for sustained oscillations, Barkhausen criterion is $A\beta$ equal to (A = voltage gain without feedback and β = feedback factor)

A. zero

B. $\frac{1}{2}$

C. 1

D. 2

Answer: C

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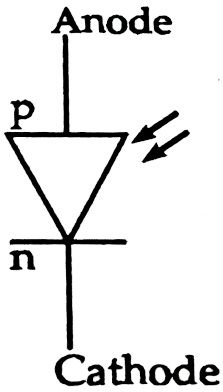
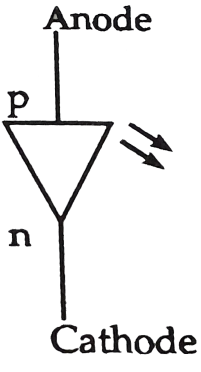
2. The schematic symbol of light emitting diode (LED) is

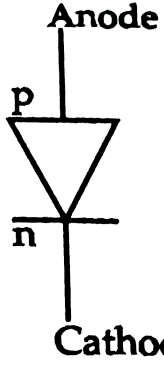
A.



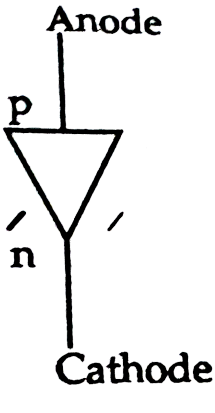
B.



C.



D.



Answer: B

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Communication Systems

1. The maximum frequency of transmitted radio waves above which the radio waves are no longer reflected back by ionosphere is (N = maximum electron density of ionosphere, g = acceleration due to gravity)

A. gN

B. gN^2

C. $g\sqrt{N}$

D. g^2N^2

Answer: C

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