PHYSICS

BOOKS - NTA MOCK TESTS

NTA NEET SET 45

Physics

1. The ratio of the wavelengths for $2 \rightarrow 1$ transition in Li^{++}, He^{+} and H is

A. $1:2:3$

B. $\frac{1}{9}:\frac{1}{4}:\frac{1}{1}$

C. $1:4:1$

D. $3:2:1$

Answer: B

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2. An α particle and a proton are accelerated from rest by a potential difference of 100V. After this, their de-Broglie wavelengths are λ_a

and λ_p respectively. The ratio $\frac{\lambda_p}{\lambda_a}$, to the nearest integer, is.

A. 3

B. 2

C. 4

D. 5

Answer: A

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3. Two homogeneous spheres A and B of masses m and $2m$ having radii $2a$ and a respectively are placed in contact. The ratio of distance of c.m from first sphere to the distance of c.m from second sphere is :

A. a

B. 2a

C. 3a

D. None of these

Answer: B

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4. Three identical spheres lie at rest along a line on a smooth horizontal surface. The separation between any two adjacent spheres is L. The first sphere is moving with a velocity u towards the second sphere at time t = 0. The coefficient of restitution for a collision between any two blocks is $\frac{1}{3}$ The correct statement is

A. The third sphere will start moving at $t = \frac{5L}{2u}$

B. The third sphere will start moving at $t = \frac{4L}{u}$

C. The centre of mass of the system will have a final speed 2u

D. The centre of mass of the system will have of final speed u

Answer: A

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5. A particle performing uniform circular motion gas angular momentum L. If its angular frequency is double and its kinetic energy halved, then the new angular momentum is :

A. 2L

B. 4L

C. L/2

D. L/4

Answer: D

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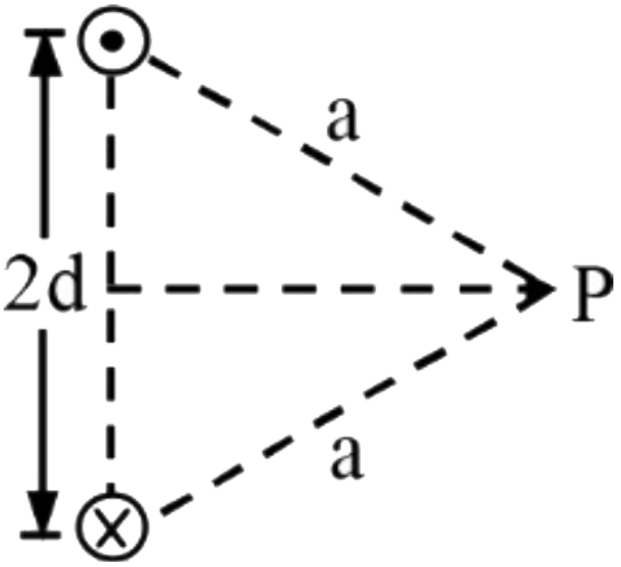
6. The same current I flows in two long parallel conductors at a distance 2d, as shown. The strength of the magnetic field at a point P,

equidistant from both conductors, is



A. $\frac{\mu_0 Id}{4\pi a}$

B. $\frac{\mu_0 Id}{2\pi a}$

C. $\frac{\mu_0 Id}{4\pi a^2}$

D. $\frac{\mu_0 Id}{\pi a^2}$

Answer: D

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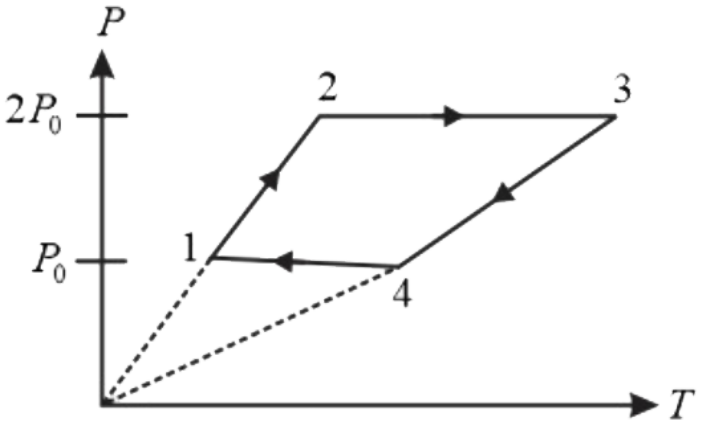
7. One mole of an ideal monoatomic gas undergoes a cyclic process, as shown in the figure. If the temperature of the gas at state 1 is 300 K and at state 4 is 500 K, then heat

exchanged during process $2 \rightarrow 3$, is



A. 1000R

B. 600R

C. 750R

D. 800R

Answer: A

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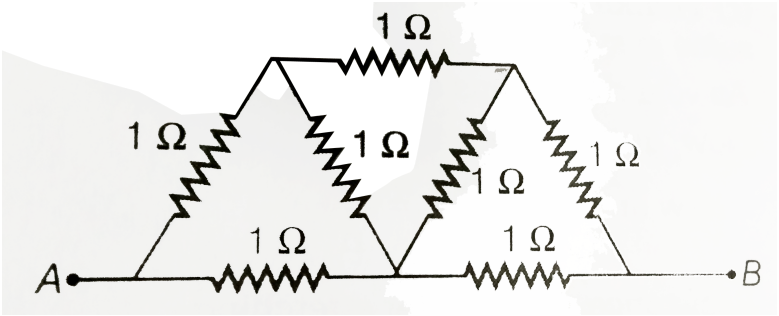
8. In the network shown in figure each resistance is 1Ω . The effective resistance between A and B is



A. $\frac{4}{3}\Omega$

B. $\frac{3}{2}\Omega$

C. 7Ω

D. $\frac{8}{7}\Omega$

Answer: D

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9. An aeroplane, in which the distance between the tips of thie wings is 50m, is flying horizontally with a speed of $360km/hour$, over a place where the vertical component of earth's magnetic field is 2.0×10^{-4} tesla. The

potential difference between the tips of the wings would be

A. 0.1 V

B. 1.0 V

C. 0.2 V

D. 0.01 V

Answer: B

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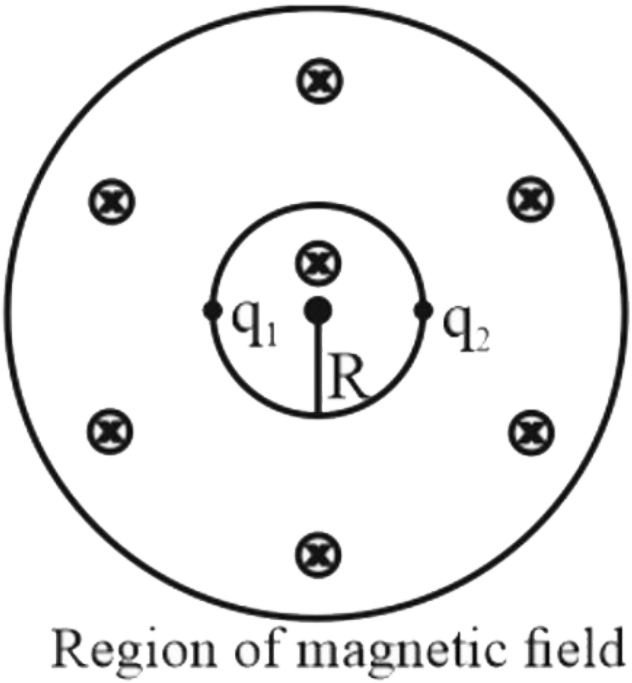
10. The figure shows a region containing a uniform magnetic field B, which is increasing at the rate $\frac{dB}{dt}$ The region is gravity free. A disc of mass m and radius R is kept in this magnetic field. Two charged particles having charge q_1 and q_2 and masses m and 2m are embedded to the non-conducting disc on the circumference at diametrically opposite points. The disc is free to translate as well as rotate.



If $q_1 = -q$ and $q_2 = q$, then the initial acceleration of q_1 will be

A. $\frac{qR}{3m}\frac{dB}{dt}$

B. $\frac{2qR}{3m}\frac{dB}{dt}$

C. $\frac{2qR}{m}\frac{dB}{dt}$

D. $\frac{qR}{m}\frac{dB}{dt}$

Answer: A

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11. Two non-conducting solid spheres of radii R and 2R, having uniform volume charge densities ρ_1 and ρ_2 respectively, touch each other. The net electric field at a distance 2R from the centre of the smaller sphere, along

the line joining the centres of the spheres, is zero. The ratio $\frac{\rho_1}{\rho_2}$ can be

A. 2

B. 8

C. 4

D. 5

Answer: C

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12. Minimum number of capacitors each of $8\mu F$ and 250 V used to make a composite capacitor of $16\mu F$ and 1000 V are

A. 4

B. 32

C. 8

D. 3

Answer: B

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13. The bob of a pendulum is released from a horizontal position. If the length of pendulum is 2 m, what is the speed with which the bob arrives at the lower most point. Assume that 10% of its energy is dissipated against air resistance.

(Take $g = 10ms^{-2}$)

A. $8ms^{-1}$

B. $4.5ms^{-1}$

C. $5ms^{-1}$

D. $6ms^{-1}$

Answer: D

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14. A point P lies on the axis of a fixed ring of mass M and radius a, at a distance a from its centre C. A small particle starts from P and reaches C under gravitational attraction only. Its speed at C will be.

A. $\sqrt{\frac{2GM}{a}}$

B. $\sqrt{\frac{GM}{a}}$

C. $\sqrt{\frac{2GM}{a}(\sqrt{2}-1)}$

D. $\sqrt{\frac{2GM}{a}\left(1-\frac{1}{\sqrt{2}}\right)}$

Answer: D

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15. If 'g' is the potential energy of an object of mass 'm' raised from the surface of the earth to a height equal to the radius 'R' of the earth is

A. mgR

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

C. $\frac{mgR}{3}$

D. $\frac{mgR}{4}$

Answer: B

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16. A slab consists of two layers of different materials of the same thickness and having

thermal conductivities K_1 and K_2. The equivalent thermal conductivity of the slab is

A. $K_1 + K_2$

B. $\sqrt{K_1 + K_2}$

C. $\frac{2K_1K_2}{K_1 + K_2}$

D. $\sqrt{\frac{K_1K_2}{K_1 + K_2}}$

Answer: C

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17. A spherical black body with a radius of 12 cm radiates 450 W power at 500 K. If the radius were halved and the temperature doubled, the power radiated in watt would be

(a)225 (b)450

(c) 900 (d)1800

A. 225

B. 450

C. 900

D. 1800

Answer: D

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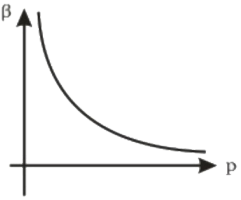
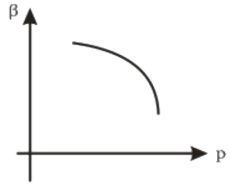
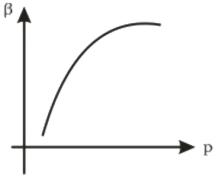
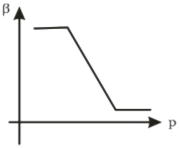
18. Which of the following graphs correctly represents the variation of $\beta = -\frac{dV/dP}{V}$ with P for an ideal gas at constant temperature?

A.



B. 

C. 

D. 

Answer: A

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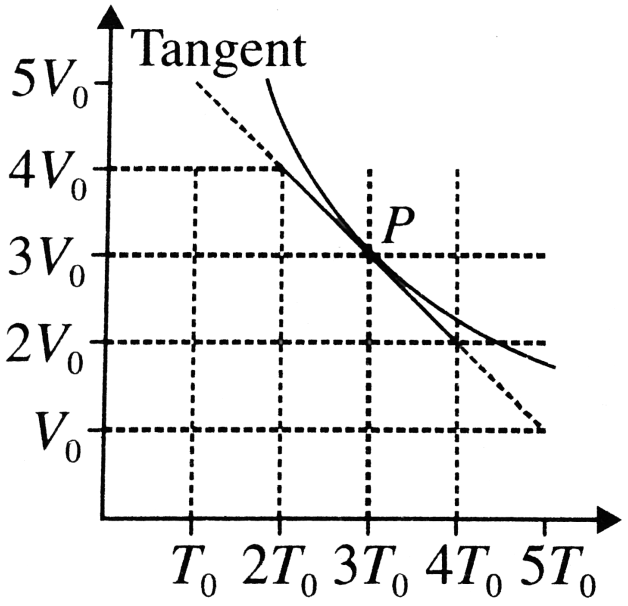
19. Figure shows the adiabatic curve for n moles of an ideal gas, the bulk modulus for the gas corresponding to the point P will be



A. $\dfrac{5nRT_0}{3V_0}$

B. $nR\left(2+\dfrac{T_0}{V_0}\right)$

C. $nR\left(1+\frac{T_0}{V_0}\right)$

D. $\frac{2nRT_0}{V_0}$

Answer: D

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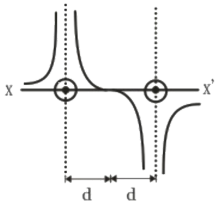
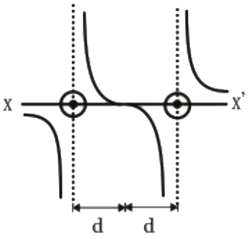
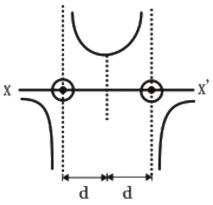
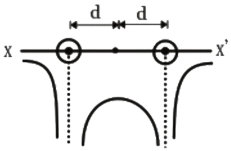
20. Two long parallel wires are at a distance $2d$ apart. They carry steady equal currents flowing out of the plane of the paper , as shown. The variation of the magnetic field B along the line XX is given by

A. 

B. 

C. 

D. 

Answer: B

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21. An electron $\left(q = 1.6 \times 10^{-19} C\right)$ is moving at right angles to a uniform magnetic field of 3.534×10^{-5} T The time taken by the electron to complete a circular orbit is

A. $2\mu s$

B. $4\mu s$

C. $3\mu s$

D. $1\mu s$

Answer: D

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22. Two particles are projected simultaneously with same speed V_0 in same vertical plane at angle 30° and 60° With the horizontal .The time at which their velocities becomes parallel is

A. $\frac{V_0}{2g}$

B. $V_0\left(\frac{\sqrt{3}+1}{2g}\right)$

C. $\frac{\sqrt{3}V_0}{2g}$

D. $\frac{V_0\left(\sqrt{3}-1\right)}{g}$

Answer: B

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23. A room (cubical) is made of mirros. An insect is moving along the diagonal on the floor such that the velocity of image of insect on two adjacent wall mirrors is $10\frac{cm}{\sec}$. The velocity of image of insect in ceiling mirror is

A. $10cms^{-1}$

B. $20cms^{-1}$

C. $\frac{10}{\sqrt{2}} cms^{-1}$

D. $10\sqrt{2} cms^{-1}$

Answer: D

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24. A body of mass $2kg$ moving on a horizontal surface with an initial velocity of $4ms^{-1}$ comes to rest after 2 second. If one wants to keep this body moving on the same surface with a velocity of $4ms^{-1}$ the force required is

A. 8 N

B. 4 N

C. zero

D. 2 N

Answer: B

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25. A horizontal constant force F pulls a block of mass m placed on a horizontal surface. If the coefficient of kinetic friction between the

block and ground is μ, find the power delivered by the external agent after a time t measured from the beginning of action of the force.

A. ma^2t

B. $\mu mgat$

C. $\mu m(a+\mu g)\mathrm{gt}$

D. $m(a+\mu g)at$

Answer: D

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26. The count rate of a Geiger Muller counter for the radiation of a radioactive material of half-life 30 min decreases to $5s^{-1}$ after $2h$. The initial count rate was

A. $25s^{-1}$

B. $80s^{-1}$

C. $625s^{-1}$

D. $20s^{-1}$

Answer: B

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27. The binding energy per nucleon of deuterium and helium nuclei are 1.1 MeV and 7.0 MeV respectively. When two deuterium nuclei fuse to form a helium nucleus the energy released in the fusion is

A. 13.9 MeV

B. 26.9 MeV

C. 23.6 MeV

D. 19.2 MeV

Answer: C

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28. The ratio of frequencies of two pendulums are 2 : 3, then their length are in ratio

A. $\sqrt{2/3}$

B. $\sqrt{3/2}$

C. $4/9$

D. $9/4$

Answer: D

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29. A pendulum clock Which ticks 60 times is one minute on earth is placed on the moon where the acceleration due to gravity is only one - sixth of that one the earth . How many times the clock will tick over there in one minute ?

A. 12.25

B. 24.5

C. 2.24

D. 0.245

Answer: B

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30. A charged oil drop falls with terminal velocity v_0 in the absence of electric field. An electric field E keeps it stationary. The drop acquires charge 3q, it starts moving upwards

with velocity v_0. The initial charge on the drop is

A. $\frac{q}{2}$

B. q

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

D. 2q

Answer: C

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31. Wavelength of a $1keV$ photon is $1.24 \times 10^{-9}m$. What is the frequency of $1MeV$ photon ?

A. $2.5 \times 10^{15} Hz$

B. $2.5 \times 10^{20} Hz$

C. $1.24 \times 10^{15} Hz$

D. $1.24 \times 10^{20} Hz$

Answer: B

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32. A ball whose density is $0.4 \times 10^3 kg/m^3$ falls into water from a height of 9 cm. To what depth does the ball sink ?

A. 9 cm

B. 6 cm

C. 4.5 cm

D. 2.25 cm

Answer: B

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33. If the compressibility of water is σ per unit atmospheric pressure, then the decrease in volume V due to atmospheric pressure P will be

A. $\sigma P / V$

B. σPV

C. σ / PV

D. $\sigma V / P$

Answer: B

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34. A wire mesh consisting of very small squares is viewed at a distance of $8cm$ through a magnifying converging lens of focal length $10cm$, kept close to the eye. The magnification produced by the lens is:

A. 5

B. 8

C. 10

D. 20

Answer: A

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35. A short linear object of length b lies on the axis of a concave mirror of focal length F at a distance u from the pole. The length of the image will be

A. $\left(\frac{f}{u-f}\right)b$

B. $\left(\frac{u-f}{f}\right)b$

C. $\left(\frac{f}{u-f}\right)^2 b$

D. $\left(\frac{u-f}{f}\right)^2 b$

Answer: C

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36. A solid cylinder of mass M and radius R rolls down an inclined plane of height h. The angular velocity of the cylinder when it reaches the bottom of the plane will be :

A. $\frac{2}{R}\sqrt{gh}$

B. $\frac{2}{R}\sqrt{\frac{gh}{2}}$

C. $\frac{2}{R}\sqrt{\frac{gh}{3}}$

D. $\frac{1}{2R}\sqrt{gh}$

Answer: C

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37. A particle of mass $m = 1kg$ is projected with speed $u = 20\sqrt{2}m/s$ at angle $\theta = 45^\circ$ with horizontal find the torque of the weight

of the particle about the point of projection when the particle is at the highest point.

A. $400N - m$

B. $200N - m$

C. $150N - m$

D. $450N - m$

Answer: A

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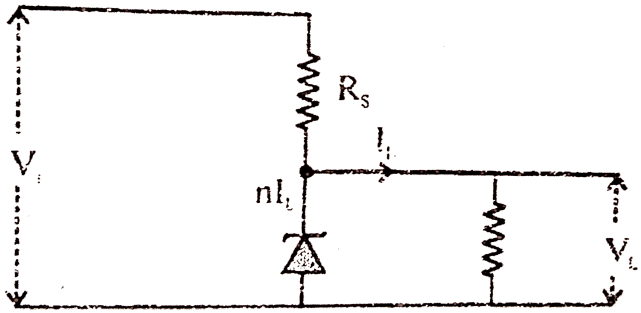
38. The value of the resistor, R_S, needed in the dc voltage regulator circuit shown here, equals :-



A. $\dfrac{(V_i + V_L)}{(n+1)I_L}$

B. $\dfrac{(V_i - V_L)}{nI_L}$

C. $\dfrac{(V_i + V_L)}{nI_L}$

D. $\dfrac{(V_i - V_L)}{(n+1)I_L}$

Answer: D

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39. Digital circuit can be made by the repetitive use of

A. OR gates

B. AND gates

C. NOT gates

D. NAND gates

Answer: D

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40. $1.56 \times 10^5 J$ of heat is conducted through is $2m^2$ wall of 12 cm thick in one hour. Temperature difference between the two sides of the wall is $20^\circ C$. The thermal conductivity of the material of the wall is (in $Wm^{-1}K^{-1}$)

A. 0.11

B. 0.13

C. 0.15

D. 1.2

Answer: B

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41. If the unit of force is 100 N, unit of length is 10m and unit of time is 100 s, what is the unit of mass in this system of units ?

A. $10^5 kg$

B. $10^6 kg$

C. $10^2 kg$

D. $10^3 kg$

Answer: A

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42. Two waves $y_1 = 3\sin\omega t cm$ and $Y = 4\cos\left(\omega t + \frac{\pi}{2}\right)$ cm product the interference pattern. Then the amplitude of the resultant wave will be

A. 1 cm

B. 3 cm

C. 4 cm

D. 5 cm

Answer: A

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43. A thin transparent sheet is placed in from of a Young's double slit. The fringe width will

A. Increase

B. Decrease

C. Remain same

D. Become non - uniform

Answer: C

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44. A source of sound of frequency 500 Hz is moving towards an observer with velocity 30

m/s . The speed of sound is 330 m/s . the frequency heard by the observer will be

A. 500 Hz

B. 550 Hz

C. 355 Hz

D. 55.5 Hz

Answer: B

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45. When a train is at a distance of 2 km , its engine sounds a whistle . A man near the railway track hears the whistle directly and by placing his ear against the track of the train. If the two sounds are heard at an internal of 5.2 s, the speed of the sound in iron (material of the rail track) is : (Given that velocity of sound in air is 330 m s^{-1})

A. $2, 325.6ms^{-1}$

B. $1, 932.4ms^{-1}$

C. $2, 132.5ms^{-1}$

D. $3, 213.2ms^{-1}$

Answer: A

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