PHYSICS

BOOKS - NTA MOCK TESTS

NTA NEET SET 57

Physics

1. If τ_1, τ_2, τ_3 and τ_4 are the magnetic torques acting on the bar magnet when it is kept at angles of $30^\circ, 60^\circ, 90^\circ$ and 135°

respectively with the direction of the magnetic field , then which among then following is correct ?

A. $\tau_1 > \tau_2 > \tau_3 > \tau_4$

B. $\tau_3 > \tau_1 > \tau_2 > \tau_4$

C. $\tau_4 > \tau_3 > \tau_2 > \tau_1$

D. $\tau_3 > \tau_2 > \tau_4 > \tau_1$

Answer: D

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2. A conductor of resistance 3Ω is stretched uniformly till its length if doubled. The wire is now bent in the form of an equivalent triangle. The effective resistance between the ends of any side of the triangle in ohm is

A. $\frac{9}{2}$

B. $\frac{8}{3}$

C. 2

D. 1

Answer: B

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3. Correct diagram for the determination of internal resistance of a primary cell by potentiometer

A. 

B. 

C. 

D. 

Answer: C

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4. In a series L-C-R circuit the voltage across resistance , capacitance and inductance is 10 V each. If the capacitance is short circuited, the voltage across the inductance will be

A. 10 V

B. $10\sqrt{2}V$

C. $\frac{10}{\sqrt{2}}V$

D. 20 V

Answer: C

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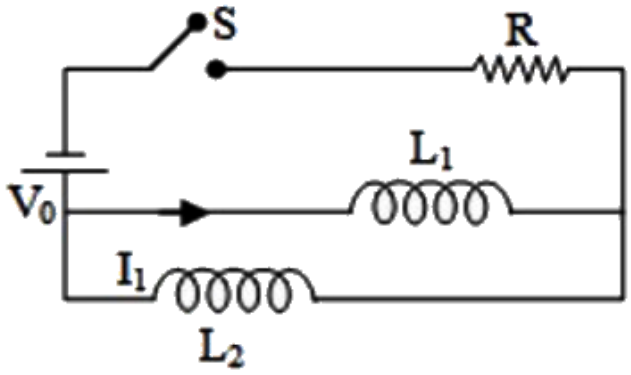
5. Find the steady - state current through L_1 in the figure



A. $\frac{V_0}{R}$

B. $\frac{V_0 L_1}{R(L_1 + L_2)}$

C. $\frac{V_0 L_2}{R(L_1 + L_2)}$

D. none of these

Answer: C

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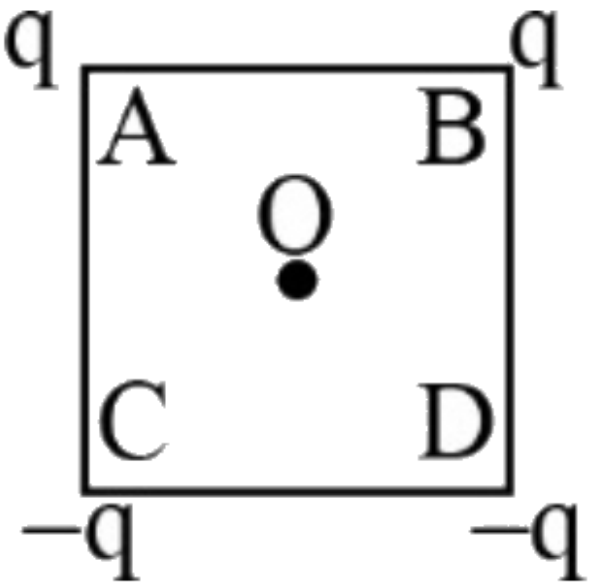
6. Charges are placed at the vertices of a square as shown in the diagram . If charges at A and B are interchanged with C and D

respectively , then,



A. only magnitude of electric field will change at the centre

B. both magnitude and direction of electric field will change at the centre

C. only direction of electric field at centre will change

D. both magnitude and direction of electric field will remain unchanged

Answer: C

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7. A particle of mass 2 g and charge $1\mu C$ is held at rest on a frictionless surface at a distance of 1m from a fixed charge of 1 mC. If

the particle is released it will be repelled. The speed of the particle when it is at distance of 10 m from fixed charge is :

A. $100ms^{-1}$

B. $90ms^{-1}$

C. $60ms^{-1}$

D. $45ms^{-1}$

Answer: B

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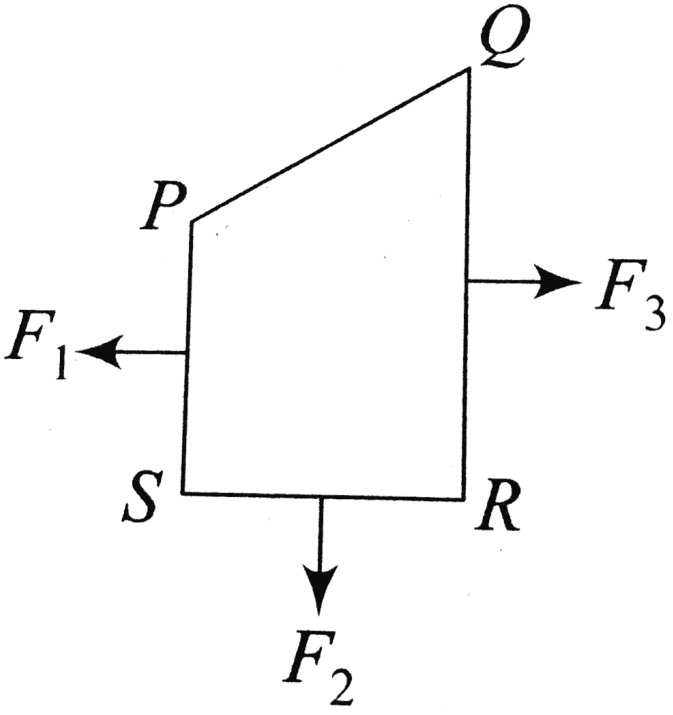
8. A closed loop $PQRS$ carrying a current is place in a unifrom magnetic forces on segments PS, SR and RQ are F_1, F_2 and F_3 respectively and are in the plane of the paper and along the directions shown, the force on the segment QP is



A. $\sqrt{(F_3 - F_1)^2 - F_2^2}$

B. $F_3 - F_1 + F_2$

C. $F_3 - F_1 - F_2$

D. $\sqrt{(F_3 - F_1)^2 + F_2^2}$

Answer: D

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9. Protons are accelerated in a cyclotron where the appilied magnetic field is 2T and the P.D across the dees is 100 KV. How many

revolutions the protons has to complete to acquire a K.E. of 20 MeV?

A. 200

B. 300

C. 150

D. 100

Answer: D

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10. Two slabs A and B of different materials but of the same thicknesss are joined end to end to form a composite slab. The thermal conductivities of A and B are K_1 and K_2 respectively. A steady temperature difference of 12°C is maintained across the composite slab. If $K_1 = \frac{K_2}{2}$, the temperature difference across slabs A is

A. $4^\circ C$

B. $8^\circ C$

C. $12^\circ C$

D. $16^\circ C$

Answer: B

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11. An ideal gas is initially at P_1, V_1 is expands to P_2, V_2 and then compressed adiabatically to the same volume V_1 and pressure P_3. If W is the net work done by the gas in complete process which of the following is true.

A. $P_3 > P_1 \& W < 0$

B. $P_3 < P_1 \& W > 0$

C. $P_3 > P_1 \& W = 0$

D. $P_3 < P_1 \& W < 0$

Answer: A

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12. A Cycle process ABCA shown in V-T diagram Fig. is preformed with a constant mass of an ideal gas. Show the same process on a P-V diagram.

A. 

B. 

C. 

D. 

Answer: A

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13. Initial pressure and volume of a gas are P and V respectively. First it is expanded isothermally to volume 4 V and then

compressed adiabatically to volume V. The final pressure of gas will be (given $\gamma = \frac{3}{2}$)

A. 1P

B. 2P

C. 4P

D. 8P

Answer: B

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14. One end of a long mettalic wire of length L is tied to the ceiling. The other end is tied to massless spring of spring constant K. A mass M hangs freely from the free end of the spring. The area of cross-section and Young's modulus of the wire are A and Y respectively. If the mass is slightly pulled down and released, it will oscillate with a time period T equal to

A. $2\pi\left(\frac{M}{k}\right)^{1/2}$

B. $2\pi\sqrt{\frac{m(YA+kL)}{YAk}}$

C. $2\pi\left[\left(\frac{mYA}{kL}\right)^{1/2}\right]$

D. $2\pi\left[\left(\frac{mL}{YA}\right)^{1/2}\right]$

Answer: B

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15. The temperature of equal masses of three different liquids A,B and C are $12^\circ C, 19^\circ C$ and $28^\circ C$ respectively. The temperature when A and B are mixed is $16^\circ C$ and when B and C are mixed it is $23^\circ C$. What

should be the temperature when A and C are mixed?

A. $15^\circ C$

B. $18.2^\circ C$

C. $20.25^\circ C$

D. $24.5^\circ C$

Answer: C

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16. Speed of transverse wave in a string of density $100kg/m^3$ and area of cross-section $10mm^2$ under a tension of 10^3 N is

A. $100ms^{-1}$

B. $1000ms^{-1}$

C. $200ms^{-1}$

D. $2000ms^{-1}$

Answer: B

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17. Check up the only correct statement in the following

A. a body has a constant velocity and still it can have a varying speed

B. a body has a constant speed but it can have a varying velocity

C. a body having constant speed cannot have any acceleration

D. all of the above

Answer: B

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18. A car of mass 1000 kg moves on a circular path with constant speed of 16 m/s. It is turned by 90 after travelling 628 m on the road. The centripetal force acting on the car is-

A. 160 N

B. 320 N

C. 640 N

D. 1280 N

Answer: C

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19. A particle moves move on the rough horizontal ground with some initial velocity V_0 . If $\frac{3}{4}$ of its kinetic enegry lost due to friction in time t_0. The coefficient of friction between the particle and the ground is.

A. $\frac{v_0}{2gt_0}$

B. $\frac{v_0}{4gt_0}$

C. $\frac{3v_0}{4gt_0}$

D. $\frac{v_0}{gt_0}$

Answer: A

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20. A block of mass 70 kg is kept on a rough horizontal surface and coefficient of static friction between block and surface is 0.4 . A man is trying to pull the block by applying a

horizontal force .The net contact force exerted by the surface on the block is F , then:

A. F must be 700 N

B. F must be 280 N

C. $700N \leq F \leq 754N$

D. F maybe greater than 754 N

Answer: C

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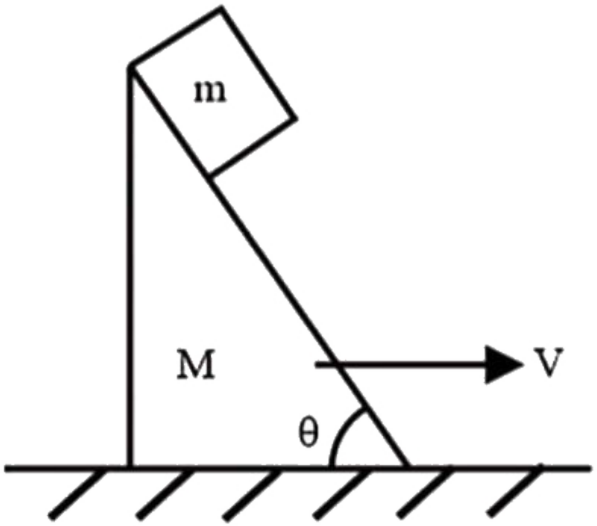
21. A block of mass m is stationary with respect to the wedge of mass M moving with uniform speed v on horizontal surface. Work done by friction force on the block in t seconds is



A. zero

B. $\frac{-mgvt}{2}\sin 2\theta$

C. $-\frac{mgvt}{2}$

D. $\frac{-mgvt}{2}\sin^2\theta$

Answer: B

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22. A square plate of edge d and a circular disc of diameter d are placed touching each other at the midpoint of an edge of the plate as shown in figure. Locate the centre of mass of

the combination assuming same mass per unit area for the two plates.

A. $\frac{2d}{2+\pi}$ left to the centre of the disc

B. $\frac{2d}{2+\pi}$ right to the centre of the disc

C. $\frac{4d}{4+\pi}$ right to the centre of the disc

D. $\frac{4d}{4+\pi}$ left to the centre of the disc

Answer: C

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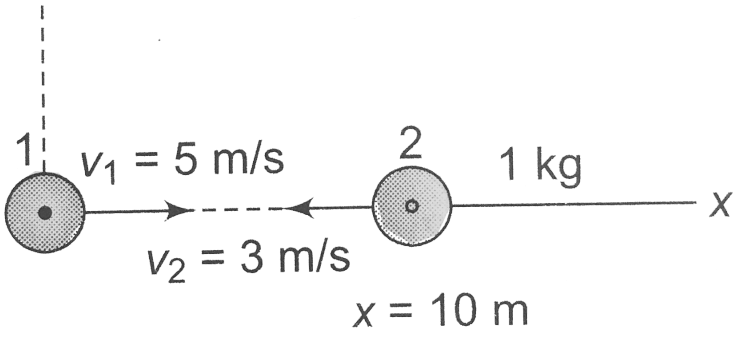
23. At $t = 0$, the positions and velocities of two particles are as shown in the figure. They are kept on a smooth surface and being mutually attracted by gravitational force. Find the position of centre of mass at $t = 2s$.



A. X = 5 m

B. X = 7 m

C. X = 3 m

D. X = 2 m

Answer: B

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24. A nucleus moving with velocity $\bar{v}$ emits an α-particle. Let the velocities of the α-particle and the remaining nucleus be $\bar{v}_1$ and $\bar{v}_2$ and their masses be m_1 and (m_2) then,

A. all velocity vectors $\vec{v}, \vec{v}_1$ and $\vec{v}_2$ must be parallel

B. $\vec{v}$ must be parallel to $\left(\vec{v}_1 + \vec{v}_2\right)$

C. $\vec{v}$ must be parallel to $\left(m_1\vec{v}_1 + m_2\vec{v}_2\right)$

D. none of above

Answer: C

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25. A particle moves in a circle of radius 25 cm at two revolutions per sec. The acceleration of the particle in m / s^2 is:

A. π^2

B. $8\pi^2$

C. $4\pi^2$

D. $2\pi^2$

Answer: C

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26. If the change in the value of g at a height h above the surface of the earth is the same as at a depth x below it, then (both x and h being much smaller than the radius of the earth)

A. x = h

B. x = 2h

C. $x = \frac{h}{2}$

D. $x = h^2$

Answer: B

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27. An artificial satellite moving in circular orbit around the earth has total (kinetic + potential) energy E_0. Its potential energy and kinetic energy respectively are :

A. $-E_0$

B. $1.5E_0$

C. $2E_0$

D. E_0

Answer: C

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28. A particle of mass m is acted upon by a force $F = t^2 - kx$. Initially , the particle is at rest at the origin. Then

A. its displacement will be in simple harmonic

B. its velocity will be in simple harmonic

C. its acceleration will be in simple harmonic

D. None of the above

Answer: D

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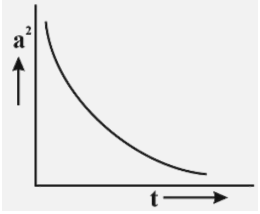
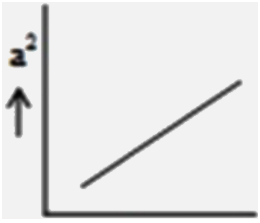
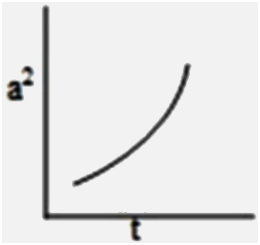
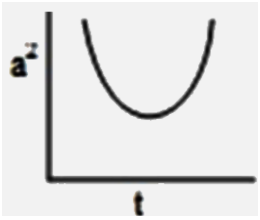
29. In an experiment , to find the loss of energy with respect to time in case of swinging simple pendulum , the graph between $(amplitude)^2$ and time is

A. 

B. 

C. 

D. 

Answer: A

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30. A ball falling in a lake of depth $200m$ shows a decrease of 0.1% in its volume at the bottom. The bulk modulus of elasticity of the material of the ball is (take $g = 10ms^{-2}$)

A. $10^9 Nm^{-2}$

B. $2 \times 10^9 Nm^{-2}$

C. $3 \times 10^9 Nm^{-2}$

D. $4 \times 10^9 Nm^{-2}$

Answer: B

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31. A capillary glass tube records a rise of $20cm$ when dipped in water. When the area of cross-section of the tube is reduced to half of the former value, water will rise to a height of

A. 10 cm

B. 20 cm

C. 40 cm

D. 80 cm

Answer: C

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32. The moment of intertia of a disc about an axis passing through its centre and normal to its plane is I. The disc is now folded along a diameter such that the two halves are mutually perpendicular. Its moment of inertia about this diameter will now be

A. I

B. $\frac{I}{\sqrt{2}}$

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

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

Answer: C

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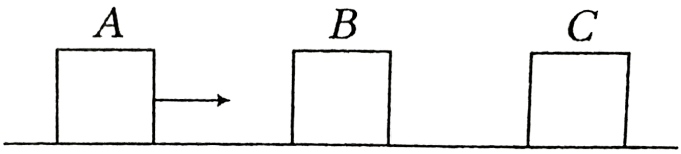
33. Three identical blocks A, B and C are placed on horizontal frictionless surface. The blocks B and C are at rest. But A is approaching towards B with a speed of $10ms^{-1}$



The coefficient of restitution for all collision is 0.5. The speed of the block C just after collision is

A. $5.6ms^{-1}$

B. $6ms^{-1}$

C. $8ms^{-1}$

D. $10ms^{-1}$

Answer: A

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34. A beam of α - particle is incident on a gold foil . Corresponding to the incident beams A , B and C , the emergent beams A' , B' and C' . The transmission and deflection of α - particles through the foil take place such that

A. the number of α - particle in A' is maximum and in B' minimum

B. the number of α - particle in A' is maximum and in C' maximum

C. the number of α - particle in A' is maximum and in C' is the same .

D. the number of α - particle in B' is maximum and in C' maximum

Answer: A

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35. According to Bohr's theory, the time averaged magnetic field at the centre (i.e. nucleus) of a hydrogen atom due to the motion of electrons in the n^{th} orbit is proportional to :

(n = principal quantum number)

A. $\frac{1}{n^3}$

B. $\frac{1}{n^5}$

C. n^5

D. n^3

Answer: B

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36. The activity of a radioactive element decreases to one third of the original activity I_0 in a period of nine years. After a further lapse of nine years, its activity will be

A. I_0

B. $\frac{2}{3}I_0$

C. $\frac{I_0}{9}$

D. $\frac{I_0}{6}$

Answer: C

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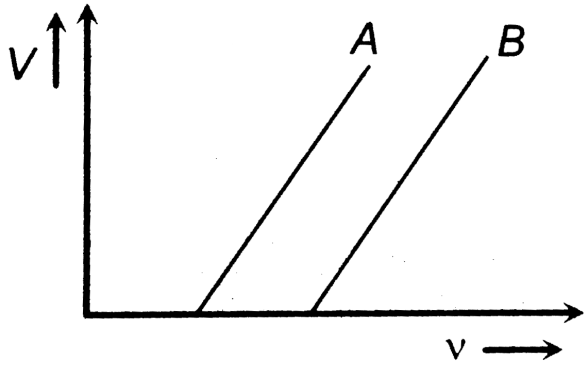
37. The stopping potential as a function of the frequency of the incident radiation is plotted for two different photoelectric surfaces A and B . The graphs show that work function of A

is



A. greater than that of B

B. smaller than that of B

C. same as that of B

D. such that no comparison can be done from given graphs

Answer: B

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38. According to Einstein's photoelectric equation , the graph between the kinetic energy of photoelectrons ejected and the frequency of incident radiation is

A. 

B. 

C. 

D. 

Answer: C

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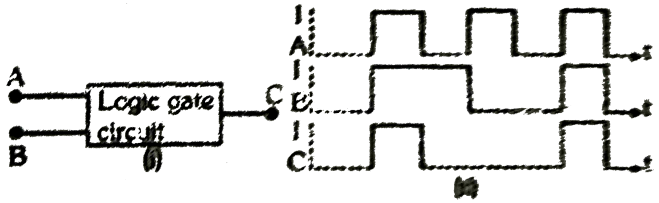
39. The following figure shows a logic gate circuit with two inputs A and B output C. The voltage waveforms of A,B and C are as shown in second figure given below :-



The logic circuit gate is :-

A. OR gate

B. AND gate

C. NAND gate

D. NOR gate

Answer: B

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40. In a common base transistor circuit, the current gain is 0.98. On changing the emitter

current by 5.00 mA, the change in collector current is

A. 0.196 mA

B. 2.45 mA

C. 4.9 mA

D. 5.1 mA

Answer: C

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41. A common emitter transistor amplifier has a current gain of 50. If the load resistance is $4k\Omega$, and input resistance is 500Ω, the voltage gain of amplifier is.

A. 160

B. 200

C. 400

D. none

Answer: C

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42. Calculate the dispersive power for crown glass from the given data

$\mu_v = 1.523$ and $\mu_r = 1.5145$.

A. 2°

B. 3°

C. 0.0163°

D. 2.5°

Answer: C

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43. The face AC of a prism ABC of refracting angle 30° is silvered . A ray is incident on face AB at an angle of 45° as shown in figure . The refracted ray undergoes reflection at face AC and retraces its path . The refractive index of the prism is

A. $\sqrt{2}$

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

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

D. $\frac{4}{3}$

Answer: A

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44. A beam of light of wave length 600 nm from a distance source fall on a single slit 1mm wide and a resulting. Diffraction pattern is observed on a screen 2m away. The distance

between the first dark fringes on either side of central bright fringe is

A. 1.2 cm

B. 1.2 mm

C. 2.4 cm

D. 2.4 mm

Answer: D

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45. Two polaroids are placed in the path of unpolarized beam of intensity I_0 such that no light is emitted from the second polarid. If a third polaroid whose polarization axis makes an angle θ with the polarization axis of first polaroid, is placed between these two polariods then the intensity of light emerging from the last polaroid will be

A. $\left(\frac{I_0}{8}\right)\sin^2(2\theta)$

B. $\left(\frac{I_0}{4}\right)\sin^2(2\theta)$

C. $\left(\frac{I_0}{2}\right)\cos^4(\theta)$

D. $I_0 \cos^4 \theta$

Answer: A

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