PHYSICS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

MOCK TEST 1

Mcqs

1. An iron rod of $0 \cdot 2cm^2$ cross-sectional area is subjected to a magnetising field of

$1200Am^{-1}$. The suscaptibility of iron is 599. Find the permeability and the magnetic flux produced.

A. $0.904 \times 10^{-5}Wb$

B. $1.81 \times 10^{-5}Wb$

C. $2.34 \times 10^{-5}Wb$

D. $5.43 \times 10^{-5}Wb$

Answer: B

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2. IN a new system of units called star units, 1 kg* = 10 kg , 1m* = 1km and 1s*= 1minute, what will be the value of 1J of energy in the new system?

A. $2.4 \times 10^{-5} J^*$

B. $3.6 \times 10^{-4} J^*$

C. $4.2 \times 10^{-3} J^*$

D. $4.2 \times 10^{2} J^*$

Answer: B

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3. The photoelectric threshold for a certain metal surface is 3600 Å. If themeal surface is irradiated by a wavelength of 1100 Å, the kinetic energy of the emitted photoelectrons is

A. 1.1 eV

B. 2 eV

C. 2.3 eV

D. 7.8 eV

Answer: D

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4. According to Bohr's theory, the radius of the nth Bohr orbit of a hydrogen like atom of atomic number Z is proportional to

A. $\frac{Z^2}{n^2}$

B. $\frac{Z}{n}$

C. $\frac{n}{Z}$

D. $\frac{n^2}{Z}$

Answer: D

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5. 1 Curie is equal to.

A. 10^6 disintegrations per second

B. 1 disintegration per second

C. 3.7×10^7 disintegrations per second

D. 3.7×10^{10} disintegrations per second

Answer: D

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6. If the area to be covered for TV telecast is doubles then height of transmitting antenna (TV tower) will have to be:

A. doubled

B. halved

C. quadrupled

D. kept unchanged

Answer: A

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7. A car turns a corner on a slippery road at a speed of $12ms^{-1}$. If the coefficient of friction is 0.4, the (in m) in which the car turns is

A. 72

B. 36

C. 18

D. 9

Answer: B

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8. The acceleration due to gravity on the earth of radius R_e is g_e and that on moon of radius R_m is g_m. The ratio of the masses of the earth and moon is given by

A. $\frac{g_e}{g_m}\sqrt{\left(\frac{R_e}{R_m}\right)}$

B. $\frac{g_e}{g_m} \cdot \frac{R_e}{R_m}$

C. $\frac{g_e^2}{g_m^2} \times \frac{R_e}{R_m}$

D. $\frac{g_e}{g_m} \times \frac{R_e^2}{R_m^2}$

Answer: D

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9. A wheel is rotating at 900 rpm about its axis. When the power is cut off, it comes to rest in 1 min. The angular retardation (in rad s^{-2}) is

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

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

C. $\frac{\pi}{6}$

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

Answer: A

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10. The total energy of the body executing SHM is E. the, the kinetic energy when the displacement is half of the amplitude is

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

B. $\frac{E}{4}$

C. $3\frac{E}{4}$

D. $\frac{\sqrt{4}}{4}E$

Answer: C

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11. The component of vector $A = 2\hat{i} + 3\hat{j}$ along the vector $\hat{i} + \hat{j}$ is

A. $\frac{1}{\sqrt{2}}$

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

C. $\frac{5}{\sqrt{2}}$

D. $\frac{7}{\sqrt{2}}$

Answer: C

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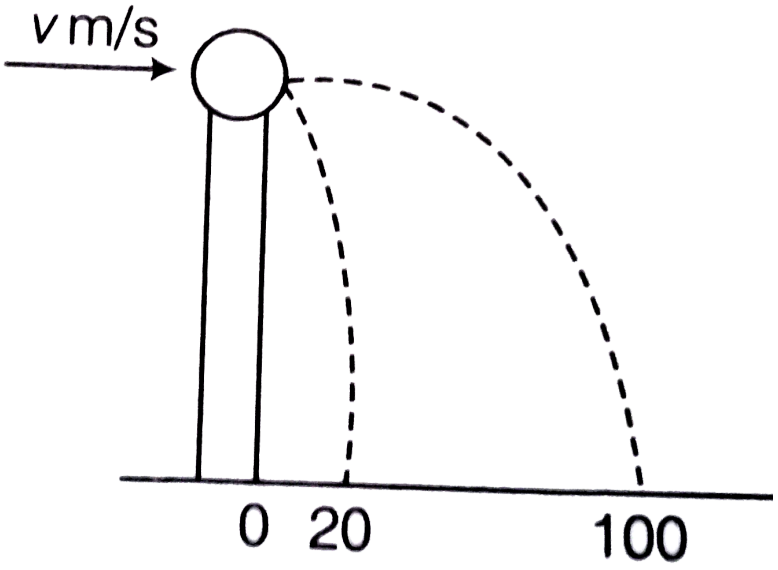
12. A ball of mass 0.2 kg rests on a vertical post of height 5m. A bullet of mass 0.01 kg, travelling with a velocity v m/s in a horizontal direction, hits the centre of the ball. After the collision, the ball and ullet travel

independently. The ball hits the ground at a distance of 20 m and the bullet at a distance of 100m from the foot of the post. the initial velocity v of the bullet is



A. 250 m/s

B. $250\sqrt{2}m/s$

C. $400m/s$

D. $500m/s$

Answer: D

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13. A stress of $3.18 \times 10^8 \ \mathrm{Nm}^{-2}$ is applied to a steel rod of length 1 m along its length, its Young's modulus is $2 \times 10^{11} \mathrm{Nm}^{-2}$. Then the elongation in mm produced in the rod, is

A. 3.18

B. 6.36

C. 5.18

D. 1.59

Answer: D

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14. Prove that if two bubbles of radii r_1 and r_2 coalesce isothermally in vacuum then the radius of new bubble will be $r = \sqrt{r_1^2 + r_2^2}$

A. $R = (r_1 + r_2)/2$

B. $R = [r_1 r_2/(r_1 - r_2)]$

C. $R = \sqrt{(r_1^2 + r_2^2)}$

D. $R = r_1 + r_2$

Answer: B

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15. A transverse wave is derscried by the equation $y = y_0 \sin 2\pi\left(ft - \frac{x}{\lambda}\right)$. The

maximum particle velocity is equal to four times the wave velocity if :-

A. $y_0\pi$

B. $\frac{y_0\pi}{2}$

C. $2y_0\pi$

D. $15y_0\pi$

Answer: B

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16. The extension in a string, obeying Hooke's law, is x. The speed of sound in the stretched string is v. If the extension in the string is increased to $1.5x$, the speed of sound will be :-

A. 15x

B. 1x

C. 0.5x

D. 2x

Answer: A

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17. Which of the following quantities is zero on an average for the molecules of an ideal gas in equilibrium?

A. Kinetic energy

B. Momentum

C. Density

D. Speed

Answer: B

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18. What work will be done, when 3 moles of an ideal gas are compreseed to half the initial volume at a constant temperature of 300K?

A. $-5177J$

B. $5000J$

C. $5177J$

D. $-5000J$

Answer: A

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19. Two coherent monochromatic light beams of intensities I and 4I are superposed. The maximum and minimum possible intensities in the resulting beam are

A. 5l and 4l

B. 5l and 3l

C. 9 l and l

D. 9l and 3l

Answer: C

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20. The sodium yellow doubled has wavelength 5890 Å and λ Å$(\lambda > > 5890\text{Å})$ and resolving power of a grating to resolve these lines is 982, then value of λ is

A. 5896 Å

B. 5880 Å

C. 5869 Å

D. 5876 Å

Answer: A

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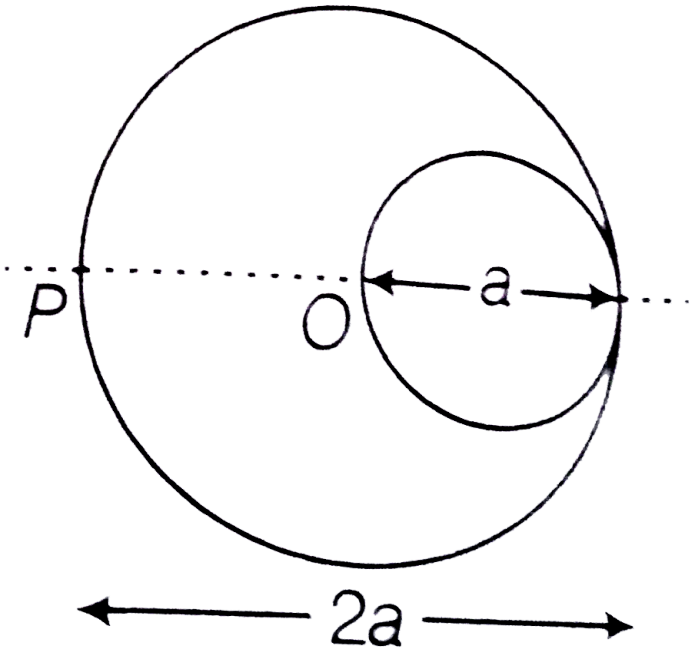
21. A cylinderical cavity of diameter a exists inside a cylinder of diameter 2a as shown in the figure. Both the cylinder and the cavity are infinitely long. A uniform current density J flows along the length. If the magnitude of the magnetic field at the point P is given by

$\frac{N}{12}\mu_0 aJ$, then the value of N is



A. 5

B. 6

C. 7

D. 4

Answer: A

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22. What work must be done to rotate an electricdipole thurgh an angle θ with the electric field, if an electric dipole of moment P is placed in an uniform electric field E with P parallel to E ?

A. $W = pE(1 - \cos\theta)$

B. $W = pE(1 + \cos\theta)$

C. $W = 2pE(1 - \cos\theta)$

D. none of these

Answer: A

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23. Angle between equipotential surface and lines of force is

A. 45°

B. 90°

C. 0°

D. 180°

Answer: B

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24. A $5^\circ C$ rise in the temperature is observed in a conductor by passing some current. When the current is doubled, then rise in temperature will be equal to

A. 20°

B. $16^\circ C$

C. $12^\circ C$

D. $10^\circ C$

Answer: A

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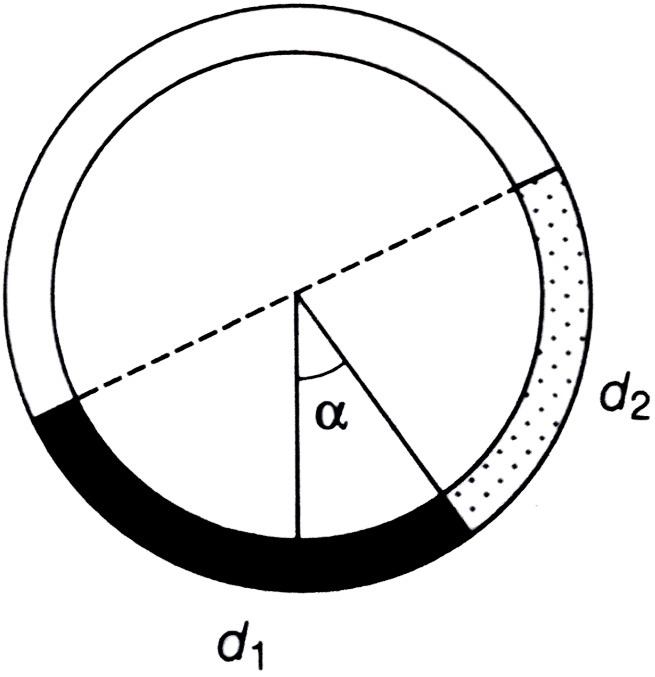

25.

There is a circular tube in a vertical plane. Two liquids which do not mix and of densiities d_1 and d_2 are filled I the tube. Each liquid subtends 90° angle at centre. Radius joining

their interface makes an angle α with vertical.

Ratio d_1 / d_2 is

A. $\frac{1+\sin\alpha}{1-\sin\alpha}$

B. $\frac{1+\cos\alpha}{1-\cos\alpha}$

C. $\frac{1+\tan\alpha}{1-\tan\alpha}$

D. $\frac{1+\sin\alpha}{1-\cos\alpha}$

Answer: C

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26. Which of the following expression represents the relation between orbital magnetic moment and orbital angular momentum of an electron?

A. $\mu_{\text{orb}} = -\frac{2m_e}{e}L_{\text{orb}}$

B. $\mu_{\text{orb}} = -2m_eL_{\text{orb}}$

C. $\mu_{\text{orb}} = \frac{e}{2m_e}L_{\text{orb}}$

D. $\mu_{\text{orb}} = \frac{e}{2m_e}L_{\text{orb}}$

Answer: C

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27. An idduced emf is produced when a magnet is plunged into a coil. The magnitude of the induced emf is independent of

A. the strength of the magnetic

B. the speed of the magnetic

C. the resistance of the coil

D. the number of turns in the coil

Answer: C

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28. The total energy of an electron in the nth orbit of the hydrogen atom is proportional to

A. n

B. 1/n

C. $-1/n^2$

D. $1/n^2$

Answer: C

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29. At some instant, a radioactive sample S_1 having an activity 5 μCi has twice the number of nuclei as another sample S_2 which has an activity of 10 μCi. The half lives of S_1 and S_2 are :

A. 0.25

B. 0.75

C. 4

D. 2

Answer: C

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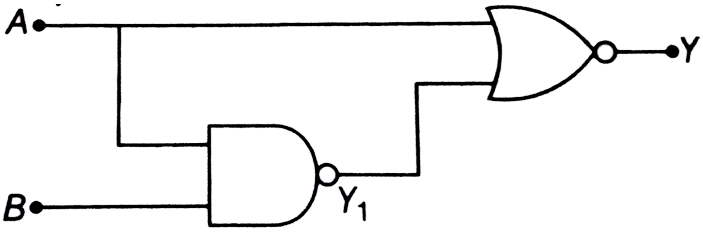
30. The output of the combination of the gates shown is



A. $\left(\overline{A+\left(\overline{(A.\,B)}\right)}\right)$

B. $(A.\,B)+\left(\overline{A}.\,\overline{B}\right)$

C. $(A+B).\left(\overline{A.B}\right)$

D. $(A+B)\left(\overline{A}+\overline{B}\right)$

Answer: A

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31. A 1000 kHz carrier wave is modulated by an audio signal of frequency range 100-5000 Hz. Then, the width of channel (in kHz) is

A. 5

B. 10

C. 20

D. 50

Answer: B

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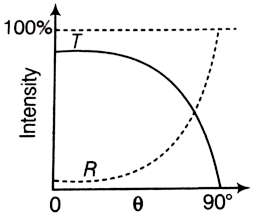
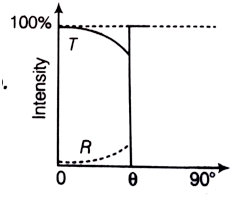
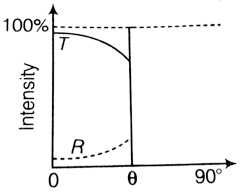
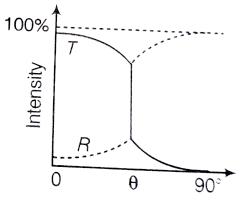
32. A light ray travelling in glass medium is incident of glass- air interface at an angle of incidence θ. The reflected (R) and transmitted

(T) intensities, both as function of θ, are plotted The correct sketch is

A. 

B. 

C. 

D. 

Answer: C

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33. 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. $x = h/2$

D. $x = h^2$.

Answer: B

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34. The moment of inertia of a body about a given axis is $1.2kgm^2$. Initially, the body is at rest. In order to produce a rotational KE of $1500J$, for how much duration, an acceleration of $25rads^{-2}$ must be applied about that axis ?

A. 4s

B. 2s

C. 8s

D. 10s

Answer: B

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35. When a particle oscillates simple harmonically, its kinetic energy varies periodically. If frequency of the particle is n, the frequency of the kinetic energy is

A. 4n

B. n

C. 2n

D. n/2

Answer: C

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36. The following four wires of length L and radius r are made of the same material. Which

of these will have the largest extension, when the same tension is applied?

A. L=50cm,r=0.25mm

B. L=100cm, r=0.5mm

C. L=200cm, r=1mm

D. L=300cm, r=1.5mm

Answer: A

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37. A body subjected to strain a number of times does not obey Hook's law due to

A. yield point

B. permanent state

C. elastic fatigue

D. breaking stress

Answer: A

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38. The work done in blowing a bubble of volume V is W, then what is the work done in blowing a soap bubble of volume $2V$?

A. $(2)^{1/3}W$

B. $2W$

C. $(4)^{1/3}W$

D. $4W$

Answer: C

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39. Along a stretched wire a transverse wave passes with speed 3000 m/s. If the tension in the wire increased four times, then the velocity of the wave is

A. 1500 ms^{-1}

B. 3000 ms^{-1}

C. 6000 ms^{-1}

D. 9000 ms^{-1}

Answer: C

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40. A boy watches a jet plane flying from north to south. When the jet is just seen above his head, the sound of jet appears to reach him makin some angle with horizontal from north.If the velocity of jet is v/2, then find the angle.

A. 60°

B. 30°

C. 45°

D. 15°

Answer: A

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41. Some gas at 300K is enclosed in a container. Now the container is placed on a fast moving train. While the train is in motion, the temperature of the gas

A. rises above 300 K

B. fails below 300 K

C. remains unchanged

D. becomes unsteady

Answer: C

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42. In Young's double slit experiment with monochromatic light of wavelength 600 nm, the distance between slits is 10^{-3}m. For changing fringe width by $3 \times 10^{-5}m$

A. the screen is moved away from the slits by 5cm

B. the screen is moved by 5 cm towards the slits

C. the screen is moved by 3 cm towards the slits

D. both (a) and (b) are correct.

Answer: D

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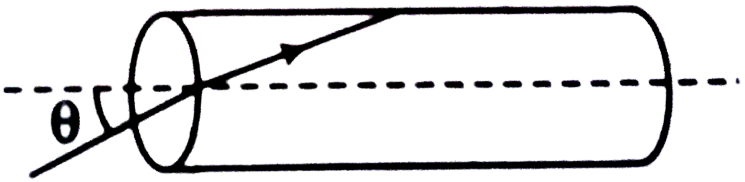
43. A transparent solid cylinderical rod has a refractive index of $2\sqrt{3}$. It is surrounded by air. A light ray is incident at the mid-point of one end of the rod as shown in the figure. The incident angle θ for which the light ray grazes along the wall of the rod is



A. $\sin^{-1}\left(\frac{1}{2}\right)$

B. $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$

C. $\sin^{-1}\left(\frac{2}{\sqrt{3}}\right)$

D. $\sin^{-1}\left(\frac{1}{\sqrt{3}}\right)$

Answer: D

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44. n identical coherent waves each with the same initial phase arrive at a point with identical path length. The intensity produced at this point is l_1. If the waves are all incoherent, the intensity produced is l_2. The ratio $\frac{l_1}{l_2}$ is

A. nl_0

B. $n^2 l_0$

C. $n^3 l_0$

D. $\frac{l_n}{n}$

Answer: B

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45. An electric dipole, made up of a positive and negative charge, each of 1 mC and placed at a distannce 2 cm apat. If the dipole is placed

in an electric field of $10^5 NC^{-1}$, then calculate the maximum torque.

A. $2 \times 10^{-3} N - m$

B. $3 \times 10^{-3} N - m$

C. $4 \times 10^{-3} N - m$

D. $2.8 \times 10^{-3} N - m$

Answer: C

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46. A large glass slabe $(\mu = 5/3)$ of thickness 8cm is placed over a point source of light on a plane surface. It is seen that light emerges out of th etop surface fo the slab from a circular area of radius R cm. What is the value of R?

A. 6 cm

B. 7 cm

C. 8 cm

D. 9 cm

Answer: A

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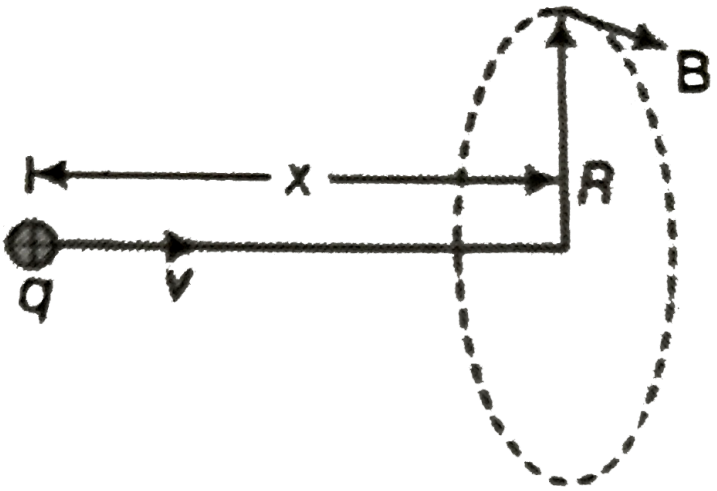
47. A charge q(gt0) moves towards the centre of a circular loop of radius R along its axis. The magnitude of B along the periphery of the loop is



A. zero

B. $\frac{\mu_0}{4\pi}\frac{qvR}{\sqrt{\left(R^2+x^2\right)^3}}$

C. $\frac{qvR}{\sqrt{R^2+x^2}}$

D. none of these

Answer: B

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48. In a 3-phase full-wave rectifier of 50 Hz supply, the ripple frequency is

A. 300 Hz

B. 50 Hz

C. 400 Hz

D. 600 Hz

Answer: A

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