JEE Main April 2026

Question Paper With Text Solution

05 April | Shift-1

PHYSICS

MATRIX

JEE Main & Advanced | XI-XII Foundation| VI-X Pre-Foundation

Office : Piprali Road, Sikar (Raj.) | Ph. 01572-241911
Website : www.matrixedu.in ; Email : smd@matrixacademy.co.in

JEE MAIN APRIL 2026 | 05 APRIL SHIFT-1

SECTION – A

Question ID : 695278326

26. In a Vernier calipers, when both jaws touch each other, zero of the Vernier scale is shifted to the right of zero of the main scale and 7th Vernier division coincides with a main scale reading. If the value of 1 main scale division is 1 mm and there are 10 Vernier scale divisions, then the Vernier caliper has :

(1) 0.07 cm negative zero error
(2) 0.7 cm negative zero error
(3) 0.07 cm positive zero error
(4) 0.7 cm positive zero error

Ans. (3)

Sol. $L \cdot C \cdot = \frac{1M \cdot S \cdot D}{n} = 0.1mm$

Zero error is positive as vernier zero lies to right of zero of main scale.

+ve zero error $= V \cdot C \cdot \times L \cdot C \cdot$
$= 7 \times 0.1mm$
$= 0.7mm$
$= 0.07cm$

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27. L, C and R represents physical quantities inductance, capacitance and resistance respectively. The dimensional formula $ML^2T^{-4}A^{-2}$ corresponds to _____.

(1) $\frac{R}{\sqrt{LC}}$
(2) $\frac{R}{LC}$
(3) $\frac{C}{\sqrt{LR}}$
(4) $\frac{1}{R}\sqrt{\frac{L}{C}}$

Ans. (1)

Sol. Lets explore options in a smart way

Quality factor $= \frac{1}{R}\sqrt{\frac{L}{C}}$ = dimensionless

Hence Option D is wrong

Since we know

$$\frac{1}{\sqrt{LC}} = \omega = T^{-1}$$

Now lets explore option A

$$R = \frac{V}{I} = \frac{ML^2T^{-2}}{I^2T} = ML^2T^{-3}A^{-2}$$

Option A $\frac{R}{\sqrt{LC}} \Rightarrow ML^2T^{-3}A^{-2}T^{-1}$

$ML^2T^{-4}A^{-2}$ Option A is correct.

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28. When one moves from a point 16 km below the earth's surface to a point 16 km above the earth's surface. The change in g is approximately α %. The value of α is _____.

(Take radius of the earth = 6400 km.)

(1) 0.12 (2) 0.25

(3) 0.50 (4) 0.75

Ans. (2)

Sol. For outside point $g' = \frac{GM}{r^2}$

$$\frac{\Delta g}{g}\% = -2\frac{\Delta r\%}{r}$$

$$= -2 \times \frac{16}{6400} \times 100$$

$$= -0.5\%$$

For inside point

$$g' = \frac{GMr}{R^3}$$

$$\frac{\Delta g}{g}\% = \frac{\Delta r}{r}\% = -\frac{16}{6400} \times 100 = -0.25\%$$

So difference in g between outside point & inside point will be 0.25%.

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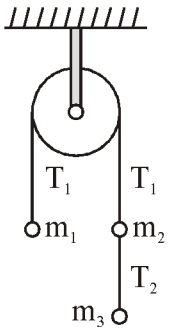
29. Three masses $m_1 = 4$ kg, $m_2 = 4$ kg and $m_3 = 6$ kg are suspended from a fixed smooth frictionless pully as shown in the figure below. The value of T_1/T_2 is _____. (take $g = 10\ m/s^2$)

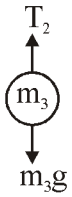


(1) 5/3 (2) 2/3

(3) 3/5 (4) 2/5

Ans. (1)

Sol. $$a = \left(\frac{m_3 + m_2 - m_1}{m_1 + m_1 + m_3}\right) \times g = \left(\frac{6+4-4}{6+4+4}\right) \times g = \frac{3g}{7}$$



$$m_3 g - T_2 = m_3 a$$

$$T_2 = m_3 g - m_3 \frac{3g}{7}$$

$$T_2 = 6 \times \frac{4g}{7} = \frac{24g}{7}$$

$$T_1 - m_1 g = m_1 a, \qquad T_1 = m_1 g + m_1 \frac{3g}{7},$$

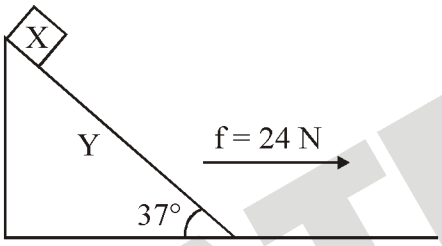
$$T_1 = \frac{10}{7} m_1 g, \qquad T_1 = \frac{40}{7} g$$

$$\frac{T_1}{T_2}=\frac{40}{24}=\frac{5}{3}$$

Question ID : 695278330

30. A wedge Y with mass of 10 kg and all frictionless surfaces and the inclined surface making 37° with horizontal. A block X with mass 2 kg is placed at the highest point of the wedge as shown in figure is at rest. At t = 0 wedge (Y) is pulled toward right with constant force (f) of 24 N. Taking the block X at rest at t = 0, the time taken by it to slide down 8.8 m on the slope, while Y is on the move, is ____ s.

(take tan 37° = 3/4 and g = 10 m/s^2)

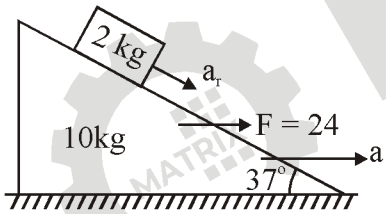


(1) 2 (2) 4

(3) $\sqrt{2}$ (4) $2\sqrt{2}$

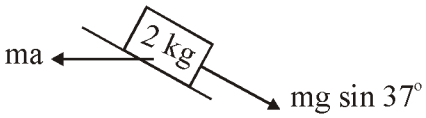
Ans. (1)

Sol.



a_r = acceleration of 2 kg relative to wedge

FBD of block in wedge frame



$$mg\sin 37 - ma\cos 37^\circ = ma_r$$

$$\frac{5}{4}(g\sin 37 - a_r) = a \quad ....(i)$$

In horizontal direction (on system)

$$F_n = m_{system}a_H$$

$$24 = 10a + 2a + 2a_r\cos 37^\circ$$

$24 = 12a + 2a_r \cos 37$ .....(ii)

Put a in eq. (ii)

$$24 = (12)\left[\left(\frac{5}{4}\left(g \times \frac{3}{5} - a_r\right)\right)\right] + 2a_r \frac{4}{5}$$

$$24 = 15 \times \frac{3g}{5} - 15a_r + \frac{8a_r}{5}$$

$$\frac{67a_r}{5} = 90 - 24$$

$$a_r = \frac{66 \times 5}{67}$$

$$S = \frac{1}{2} a_r t^2$$

$$8.8 = \frac{1}{2} \times \frac{66 \times 5}{67} t^2$$

$$0.8 = \frac{30}{2 \times 67} t^2$$

$$t^2 = \frac{8 \times 2 \times 67}{300} = 3.57 \Rightarrow t \approx 2\,\text{sec}.$$

Question ID : 695278331

31. The Young's modulus of steel wire of radius r and length L is Y. If the radius r and length L of the wire are doubled then the value of Y :

(1) increases by two times (2) reduces by half

(3) remains unchanged (4) becomes one fourth

Ans. (3)

Sol. Young modulus is material dependent & independent of radius & length.

Question ID : 695278332

32. Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R:**

Statement I : Change in internal energy of a system containing n mole of ideal gas can be written as $\Delta U = nC_v(T_f - T_i) = \frac{nR}{\gamma - 1}(T_f - T_i)$, where $\gamma = \frac{C_p}{C_v}$, T_i = initial temperature, T_f = final temperature.

Statement II : Relation between degree of freedom f and γ ($= C_p/C_v$) is $\left(\gamma = 1 + \frac{2}{f}\right)$

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

(1) Both **A** and **R** are true and **R** is the correct explantion of **A**

(2) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**

(3) **A** is true but **R** is false

(4) **A** is false but **R** is true

Ans. (2)

Sol. Theory based

Question ID : 695278333

33. Consider the following statements :

A. Zeroth law of thermodynamics gives concept of temperature

B. First law of thermodynamics gives concept of internal energy

C. In isothermal expansion of ideal gas, $\Delta Q \neq \Delta W$

D. Product of intensive and extensive variables is extensive

E. The ratio of any extensive variable to mass will be an extensive variable

Choose the correct combination of statements from the options given below :

(1) C, D and E only (2) A, B and C only

(3) A, B and D only (4) B, C and D only

Ans. (3)

Sol. Intensive variable : If you divide a system $\rightarrow$ these variable remains same.
Ex. Refractive index of full slab of glass is same as that of half slab.
Extensive variable : If you divide system $\rightarrow$ These variable gets divided.
Ex. Mass

Option A $\rightarrow$ true

Option B $\rightarrow$ true

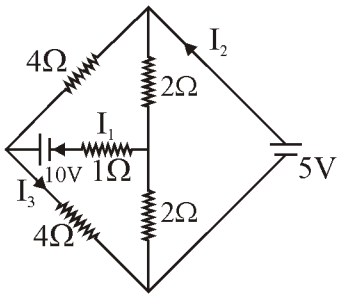
Option C $\rightarrow$ false, $\Delta Q = W$ as $\Delta U = 0$ for isothermal process.

Option D $\rightarrow$ true

Option E $\rightarrow$ false, for example $1/\rho = V/m$, V is extensive variable but ρ is intensive variable.

Question ID : 695278334

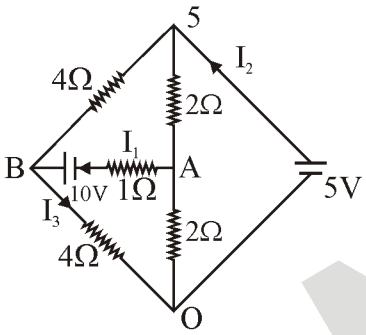
34. Refer to the figure given below. The values of I_1, I_2 and I_3 are _____.



(1) $I_1 = 2.5$ A, $I_2 = 1.875$ A, $I_3 = 1.875$ A
(2) $I_1 = 1.875$ A, $I_2 = 2.5$ A, $I_3 = 1.875$ A
(3) $I_1 = 1.875$ A, $I_2 = 1.875$ A, $I_3 = 2.5$ A
(4) $I_1 = 2.5$ A, $I_2 = 2.5$ A, $I_3 = 1.875$ A

Ans. (1)

Sol.



KCL at A.

$$\frac{5-V_A}{2}+\frac{O-V_A}{2}+\frac{V_B-10-V_A}{1}=0$$

$$5-V_A-V_A+2V_B-2V_A-20=0$$

$$2V_B-4V_A=15 \quad \text{.....(i)}$$

KCL at B.

$$\frac{5-V_B}{4}+\frac{V_A-(V_B-10)}{1}+\frac{0-V_B}{4}=0$$

$$5-V_B+4V_A-4V_B+40-V_B=0$$

$$45=6V_B-4V_A \quad \text{....(ii)}$$

Solve (i) & (ii)

$V_B = 15/2$

$V_A = 0$

$I_1 = 2.5$

$I_2 = 1.875$

$I_3 = 1.875$

Question ID : 695278335

35. An electron of mass m is moving in an electric field $\vec{E} = -2E_0\hat{i}$ (E_0 = constant > 0), with an initial velocity $\vec{V} = v_0\hat{i}$ (v_0 = constant > 0). If $\lambda_0 = \frac{h}{4mv_0}$, its de Broglie wavelength at time t is _____.

(e = charge of electron)

(1) $\frac{4\lambda_0}{\left[1-\frac{E_0 e}{2m}\frac{t}{v_0}\right]}$

(2) $\frac{4\lambda_0}{\left[1+\frac{E_0 e}{2m}\frac{t}{v_0}\right]}$

(3) $\frac{4\lambda_0}{\left[1+\frac{2E_0 e}{m}\frac{t}{v_0}\right]}$

(4) $\frac{4\lambda_0}{\left[1-\frac{2E_0 e}{m}\frac{t}{v_0}\right]}$

Ans. (3)

Sol. $v = u + at$

$$v = v_0 - \frac{e(-2E_0)t}{m}$$

$$v = v_0 + \frac{2eE_0 t}{m}$$

$$\lambda = \frac{h}{m\left(v_0 + \frac{2eE_0 t}{m}\right)}$$

$$\lambda = \frac{h}{mv_0\left(1+\frac{2eE_0 t}{mv_0}\right)}, \qquad \lambda = \frac{4\lambda_0}{\left(1+\frac{2eE_0 t}{mv_0}\right)}$$

Question ID : 695278336

36. In the hydrogen atom, the electron makes a transition from the higher orbit (i) to a lower orbit (f). The ratio of the radius of the orbits in given by $r_i : r_f = 16 : 4$. The wavelength of photon emitted due to this transition is _____ nm. (Given Rydberg constant = 1.0973×10^7/m)

(1) 121 (2) 242

(3) 486 (4) 974

Ans. (3)

Sol. $r \alpha n^2$ since ratio is given as 16:4 we are assuming

$n_i = 4$

$n_f = 2$

$$\frac{1}{\lambda} = Rz^2\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$$

$$\frac{1}{\lambda} = 1.0973 \times 10^7\left(\frac{1}{4} - \frac{1}{16}\right)$$

$$\frac{1}{\lambda} = 1.0973 \times 10^7 \frac{3}{16}$$

$$\lambda = \frac{16}{3} \times \frac{10^{-7}}{1.0973}$$

$$\lambda = 486\,nm$$

Question ID : 695278337

37. A displacement current of 4.0 A can be set up in the space between two parallel plates of 6 μF capacitor. The rate of change of potential difference across the plates of the capacitor is nearly $\alpha \times 10^6$ V/s. The value of α is _____.

(1) 0.58 (2) 0.67

(3) 0.82 (4) 0.75

Ans. (2)

Sol. $$i_d = \varepsilon_0 \frac{d\phi_E}{dt}$$

$$i_d = \varepsilon_0 \frac{d}{dt} EA$$

$$= \varepsilon_0 A \frac{d}{dt}\left(\frac{V}{d}\right)$$

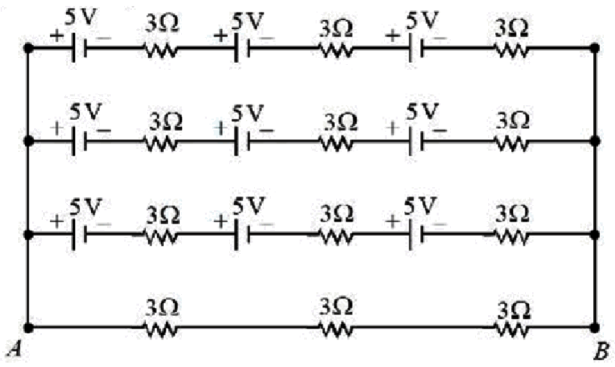
$$= \frac{\varepsilon_0 A}{d}\left(\frac{d}{dt} V\right)$$

$$4 = 6\mu f \times \frac{dv}{dt}$$

$$\frac{dv}{dt} = \frac{2}{3} \times 10^6, \quad \alpha = \frac{2}{3} = 0.67$$

Question ID : 695278338

38. Refer to the figure given below, current between terminals A and B is _____A.



(1) 12.5 (2) 1.25

(3) 7.5 (4) 5

Ans. (2)

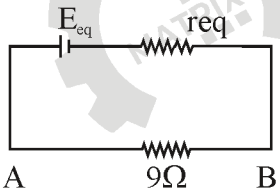
Sol. Emf of each branch $= 5 \times 3$

$= 15\,V$

resistance of each $= 3 \times 3 = 9\Omega$

$r_{equivalent} = \frac{9}{3} = 3\Omega$

$\varepsilon_{equivalent} = \left(\frac{15}{9} + \frac{15}{9} + \frac{15}{9}\right) \times 3 = 15$



$i = \frac{15}{9+3} = \frac{5}{4}A$

Question ID : 695278339

39. In Young's double slit experiment, the fringe width of the interference pattern produced on the screen is 2.4 μm. If the experiment is carried out in another medium having refractive index 1.2, the fringe width will be _____ μm.

(1) 1.2 (2) 2

(3) 2.4 (4) 2.88

Ans. (2)

Sol. $\lambda_{medium}=\frac{\lambda_{air}}{\mu_{medium}}$

$$\beta=\frac{\lambda D}{d}$$

$$\beta'=\frac{\lambda D}{d\mu}=\frac{\beta}{\mu}$$

$$\beta'=\frac{2.4\mu m}{1.2}=2\mu m$$

Question ID : 695278340

40. A ray of light passing through an equilateral prism is having velocity 2.12×10^8 m/s in the prism material, then the minimum angle of deviation is _____ degrees.

(1) 45 (2) 30

(3) 28 (4) 58

Ans. (2)

Sol. $\mu=\frac{C}{V}=\frac{3\times10^8}{2.12\times10^8}=\frac{3}{2.12}$

$$\mu=\frac{\sin\left(\frac{A+\delta_{min}}{2}\right)}{\sin\frac{A}{2}}$$

$$\frac{3}{2.12}=\frac{\sin\left(\frac{60+\delta_{min}}{2}\right)}{\sin 30}$$

$$\frac{3}{4.24}=\sin\left(\frac{60+\delta_{min}}{2}\right)$$

$$\frac{1}{\sqrt{2}}=\sin\left(\frac{60+\delta_{min}}{2}\right)$$

$45 \times 2 = 60 + \delta_{min}$

$\delta_{min} = 30$

Question ID : 695278341

41. Light source having wavelength 331 nm is used to generate photo-electrons whose stopping potential is 0.2 V. The work function of the used metal in the experiment is $\alpha \times 10^{-19}$ J. The value of α is _____.

($h = 6.62 \times 10^{-34}$ J s, $e = 1.6 \times 10^{-19}$ C and $c = 3 \times 10^{8}$ m/s)

(1) 3.68 (2) 4.68

(3) 5.68 (4) 4.68

Ans. (3)

Sol. $\frac{hc}{\lambda} = \phi + KE_{max}$

$$\frac{6.62\times10^{-34}\times3\times10^{8}}{331\times10^{-9}} = \phi + 0.2\times1.6\times10^{-19}\,J$$

$$6\times10^{-19} = \phi + 0.32\times10^{-19}$$

$$\phi = 5.68\times10^{-19}\,J$$

$$\alpha = 5.68$$

Question ID : 695278342

42. A compound microscope is designed with two symmetric biconvex lenses. The objective lens is cut vertically, creating two identical plano-convex lenses. One of them is used in place of original objective lens. To retain same magnification keeping the object distance unchanged, the tube length has to be :

(1) increased two times (2) increased 3/2 times

(3) decreased two times (4) decreased 3/2 times

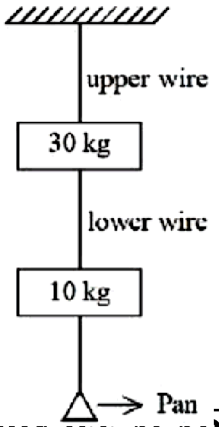
Ans. (1)

Sol. $MP = \frac{LD}{f_0 f_e}$

As f_0 becomes twice, length of tube should be doubled to keep M.P. same.

Question ID : 695278343

43. Two wires as shown in the figure below, made of steel and have breaking stress of 12×10^{8} N/m^2. Area of cross-section of upper wire is 0.008 cm^2 and of lower wire is 0.004 cm^2. The maximum mass that can be added to pan without breaking any wire is _____ kg. (take g = 10 m/s^2)



(1) 56 (2) 38

(3) 96 (4) 5.6

Ans. (2)

Sol. Lower wire

T_{max} = Stress × Area

$T_{max} = 12 \times 10^8 \times 4 \times 10^{-7}$

$T_{max} = 480$ N

Upper wire

$T_{max} = 12 \times 10^8 \times 8 \times 10^{-7}$

$T_{max} = 960$ N

For lower wire to break

$480 = mg + 10g$

$m = 38$ kg

For upper wire to break

$960 = mg + (10 + 30)g$

$m = 56g$

max mass should be less than 38 kg for both wire to not break.

Question ID : 695278344

44. An a.c. source of angular frequency ω is connected across a resistor R and a capacitor C in series. The current is observed as I. Now the frequency of the source is changed to ω/4, (keeping the voltage unchanged) the current is found to be I/3. The ratio of resistance to reactance at frequency ω is :

(1) $\sqrt{\frac{6}{7}}$ (2) $\sqrt{\frac{3}{5}}$

(3) $\sqrt{\frac{7}{8}}$ (4) $\sqrt{\frac{3}{4}}$

Ans. (3)

Sol. $$I = \frac{V}{\sqrt{R^2 + \frac{1}{w^2c^2}}} \quad \text{.....(i)}$$

$$\frac{I}{3} = \frac{V}{\sqrt{R^2 + \frac{16}{w^2c^2}}} \quad \text{.....(ii)}$$

Divide (i) / (ii)

$$3=\sqrt{\frac{R^2+16X_c^2}{R^2+X_c^2}}, \qquad \left(X_c=\frac{1}{\omega c}\right)$$

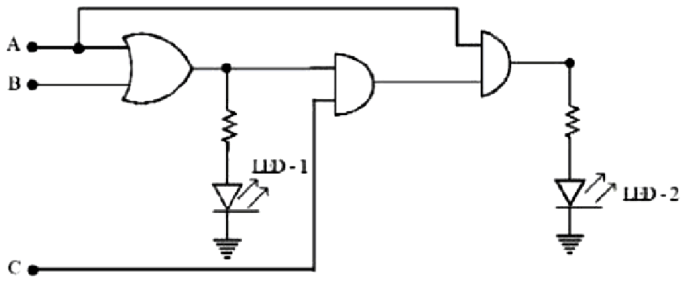
$$9R^2+9X_c^2=R^2+16X_c^2$$

$$8R^2=7X_c^2$$

$$\frac{R}{X_c}=\sqrt{\frac{7}{8}}$$

Question ID : 695278345

45. For the given logic circuit, which of the following inputs combination will make both LED-1 and LED-2 to glow ?



(1) A = 0, B = 1, C = 1 (2) A = 1, B = 0, C = 0

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

Ans. (3)

Sol. Option A $\Rightarrow$ LED-1 will glow but not LED-2

Option B $\Rightarrow$ LED-1 will glow but not LED-2

Option C $\Rightarrow$ Both LED will glow

Option D $\Rightarrow$ LED-1 will glow but not LED-2

Question ID : 695278346

46. A cube has side length 5 cm and modulus of rigidity 10^5 N/m^2. The displacement produced by a force of 10 N in the upper face of cube is _____mm.

Ans. (2)

Sol. $$\eta=\frac{F}{A}\frac{\ell}{\Delta x}$$

$$10^5=\frac{10}{25\times10^{-4}}\frac{5\times10^{-2}}{\Delta x}$$

$$\Delta x=2\times10^{-3}\,m$$

$\Delta x = 2mm$

Question ID : 695278347

47. From 18 m height above the ground a ball is dropped from rest. The height above the ground at which the magnitude of velocity equal to the magnitude of acceleration (in the same set of units) due to gravity is _____ m. (Take g = 10 m/s^2 and neglect the air resistance)

Ans. (13)

Sol. $V^2 = u^2 + 2as$

$10^2 = 0^2 + (2)(10)(s)$

$s = 5m$

Height $= 18 - 5$

$= 13$ m

Question ID : 695278348

48. A transverse wave on a string is described by y = 3sin (36t + 0.018x + π/4). where x, y are in cm and t in seconds. The least distance between the two successive crests in the wave is _____ cm. (Nearest integer) ($\pi = 3.14$)

Ans. (349)

Sol. Distance b/w two crests in λ

$$K = \frac{2\pi}{\lambda} = \frac{18}{1000} cm^{-1}$$

$$\lambda = \frac{1000\pi}{9} cm$$

$$= \frac{3140}{9} cm$$

$$\lambda = 348.8\,cm \approx 349\,cm$$

Question ID : 695278349

49. The charged particle moving in a uniform magnetic field of $(3\hat{i} + 2\hat{j})T$ has an acceleration $\left(4\hat{i} - \frac{x}{2}\hat{j}\right) m/s^2$. The value of x is :

Ans. (12)

Sol. $\vec{F}$ & $\vec{a} \perp \vec{B}$

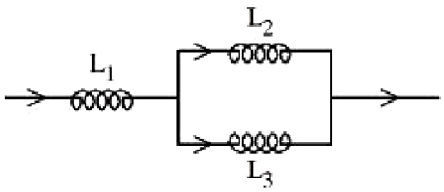
$$\left(4\hat{i} - \frac{x}{2}\hat{j}\right).\left(3\hat{i} + 2\hat{j}\right) = 0$$

$12 - x = 0$

x = 12

Question ID : 695278350

50. In the given circuit below inductance values of L_1, L_2 and L_3 are same. The magnetic energy stored in the entire circuit is (U_t) and that stored in the L_2 inductor is (U_l). U_t/U_l is _____. (Ignore the mutual inductance if any)



Ans. (6)

Sol. Current in L_2 and L_3 should be same by symmetry

$$U_L = \frac{1}{2}Li^2$$

$$U_t = \frac{1}{2}Li^2 + \frac{1}{2}Li^2 + \frac{1}{2}L(2i)^2$$

$$= 3Li^2$$

$$\frac{U_t}{U_L} = \frac{3Li^2}{\frac{1}{2}Li^2} = 6$$