JEE Main April 2026

Question Paper With Text Solution

06 April | Shift-2

PHYSICS

MATRIX

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

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JEE MAIN APRIL 2026 | 06 APRIL SHIFT-2

SECTION – A

Question ID : 6911211226

26. The percentage error in the calculated volume of a sphere, if there is 2% error in its diameter measurement, is _____ .

(1) 1 (2) 2

(3) 6 (4) 8

Ans. Official answer NTA (3)

Sol. $V = \frac{4}{3}\pi\left(\frac{d}{2}\right)^3 = \frac{\pi}{6}d^3$

$\frac{\Delta V}{V} = 3\frac{\Delta d}{d}$

$\frac{\Delta V}{V}\times 100\% = 3\left(\frac{\Delta d}{d}\times 100\%\right)$

$= 3 \times 2\%$

$= 6\%$

Question ID : 6911211227

27. Match List - I with List - II.

List - I	**List - II**
A. Boltzmann constant	I. $\left[M^{-1}L^3T^{-2}\right]$
B. Stefan's constant	II. $\left[ML^2T^{-1}\right]$
C. Planck's constant	III. $\left[ML^2T^{-2}K^{-1}\right]$
D. Gravitational constant	IV. $\left[ML^0T^{-3}K^{-4}\right]$

Choose the correct answer from the options given below :

(1) A-I, B-II, C-III, D-IV (2) A-IV, B-III, C-II, D-I

(3) A-III, B-IV, C-II, D-I (4) A-II, B-I, C-IV, D-III

Ans. Official answer NTA (3)

Sol. (A) $K.E. = \frac{3}{2}KT$

$K = \frac{2}{3}\frac{K.E.}{T}$

$[K] = \frac{M^1L^2T^{-2}}{K^{-1}}$

$= M^1L^2T^{-2}K^{-1}$

(B) $\frac{dQ}{dt} = e\sigma A\left(T_b^4 - T_s^4\right)$

$\sigma = \frac{dQ/dt}{eA\left(T_b^4 - T_s^4\right)}$

$[\sigma] = \frac{M^1L^2T^{-3}}{[0]L^2K^4}$

$= M^1L^0T^{-3}K^{-4}$

(C) $P = \frac{h}{\lambda} \Rightarrow h = P\lambda$

$[h] = (M^1L^1T^{-1})\,(L^1)$

$= M^1L^2T^{-1}$

(D) $F = \frac{Gm_1m_2}{r^2}$

$G = \frac{Fr^2}{m_1m_2}$

$[G] = \frac{M^1L^3T^{-2}}{M^2}$

$= M^{-1}L^3T^{-2}$

Question ID : 6911211228

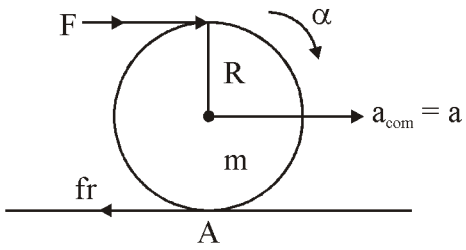
28. A solid sphere (A) of mass 5 m and a spherical shell (B) of mass m, both having same radius, are placed on a rough surface. When a force of same magnitude is applied tangentially at the highest points of A and B, they start rolling without slipping with an acceleration of a_A and a_B, respectively. The ratio of a_A and a_B is _____ .

(1) 5:21 (2) 6:10

(3) 21:25 (4) 1:5

Ans. Official answer NTA (1)

Sol.



$T.m \Rightarrow F - fr = ma$ .....(1)

$R.m \Rightarrow FR + frR = I\alpha$ .....(2)

Cond $\Rightarrow a_A = 0$

$a = R\alpha$ .....(3)

by using (2) and (3) $\rightarrow$

$$F + fr = \frac{Ia}{R^2} \quad .....(4)$$

by (1) + (4) $\rightarrow$

$$2F = \left(m + \frac{I}{R^2}\right)a$$

$$a = \frac{2F}{m + \frac{I}{R^2}}$$

for solid sphere (A) $\Rightarrow$

$$a_A = \frac{2F}{5m + \frac{2(5m)R^2}{5R^2}} = \frac{2F}{7m}$$

for hollow sphere (B) $\Rightarrow$

$$a_B = \frac{2F}{m + \frac{2mR^2}{3R^2}} = \frac{6F}{5m}$$

$$\frac{a_A}{a_B} = \frac{2}{7} \times \frac{5}{6} = \frac{5}{21}$$

Question ID : 6911211229

29. A body of mass 1 kg moves along a straight line with a velocity $v = 2x^2$. The work done by the body during displacement from x = 0 to 5 m is _____ J.

(1) 0 (2) 250

(3) 1250 (4) 1000

Ans. Official answer NTA (3)

Sol. $v = 2x^2$

$$a = v\frac{dv}{dx} = (2x^2)(4x)$$

$$F = ma = 8x^3$$

$$\omega = \int F dx = \int_0^5 8x^3 dx$$

$$\omega = 2\left(x^4\right)_0^5 = 1250$$

Question ID : 6911211230

30. A cylinder with adiabatic walls is closed at both ends and is divided into two compartments by a frictionless adiabatic piston. Ideal gas is filled in both (left and right) the compartments at same P, V, T. Heating is started from left side until pressure changes to 27 P/8. If initial volume of each compartment was 9 litres then the final volume in right-hand side compartment is _____ litres.

(for this ideal gas $C_P/C_V = 1.5$)

(1) 3 (2) 4

(3) 14 (4) 9

Ans. Official answer NTA (2)

Sol. Heating process is slow so piston is in equilibrium. i.e both side pressure is equal and right side process is adiabatic

so, $P_f V_f^{\gamma} = P_i V_i^{\gamma}$

$$\left(\frac{27P}{8}\right)(V)^{1.5} = P(9)^{1.5}$$

$$V = 9\left(\frac{4}{9}\right) = 4\,\text{lit.}$$

Question ID : 6911211231

31. For an electromagnetic wave propagating through vacuum, $\vec{k}, \vec{E}$ and ω represent propagation vector, electric field and angular frequency, respectively. The magnetic field associated with this wave is represented by :

(1) $\frac{\vec{E}\times\vec{k}}{\omega}$ (2) $\frac{\vec{k}\times\vec{E}}{\omega}$

(3) $\omega(\vec{E}\times\vec{K})$ (4) $\omega(\vec{k}\times\vec{E})$

Ans. Official answer NTA (2)

Sol. Theoretical

Question ID : 6911211232

32. Two identical bodies A and B of equal masses have initial velocities $\vec{v_1} = 4\hat{i}\,m/s$ and $\vec{v_2} = 4\hat{j}\,m/s$ respectively. The body A has acceleration $\vec{a}_1 = 6\hat{i} + 6\hat{j}\,m/s^2$ while the acceleration of the other body B is zero. The centre of mass of the two bodies moves in _____ path.

(1) circular (2) parabolic

(3) straight line (4) elliptical

Ans. Official answer NTA (3)

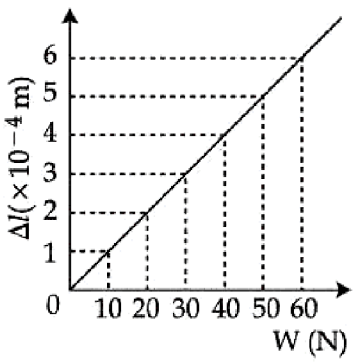
Sol. $\vec{V}_{com} = \frac{m(4\hat{i}) + m(4\hat{j})}{m+m} = 2\hat{i} + 2\hat{j}$

$\vec{a}_{com} = \frac{m(6\hat{i}+6\hat{j}) + 0}{m+m} = 3\hat{i} + 3\hat{j}$

$\vec{V} \parallel \vec{a} \rightarrow$ straight line motion.

Question ID : 6911211233

33. Figure represents the extension (Δl) of a wire of length 1 meter, suspended from the ceiling of the room at one end with a load W connected to the other end. If the cross-sectional area of the wire is $10^{-5}\ m^2$ then the Young's modulus of the wire is _____ N/m^2.



(1) 1.0×10^{11} (2) 2.0×10^{10}

(3) 1.0×10^{10} (4) 2.0×10^{11}

Ans. Official answer NTA (3)

Sol. $\frac{W}{A} = \gamma \frac{\Delta \ell}{\ell}$

$$\gamma = \frac{\ell}{A}\left(\frac{W}{\Delta \ell}\right) = \frac{\ell}{A}\left(\frac{1}{\text{slope}}\right)$$

$$\gamma = \frac{1}{10^{-5}\left(\frac{10^{-4}}{10}\right)} = 10^{10}$$

Question ID : 6911211234

34. A cylindrical vessel of 40 cm radius is completely filled with water and its capacity is 528 dm^3 (dm : decimeter) The vessel is placed on a solid block of exactly same height as vessel. If a small hole is made at 70 cm below the top of water level, then horizontal range of water falling on the ground in the beginning is _____ cm.

(1) $120\sqrt{2}$ (2) $140\sqrt{2}$

(3) $140\sqrt{3}$ (4) $120\sqrt{3}$

Ans. Official answer NTA (2)

Sol. $V = \pi r^2 h$

$$528 \times 10^{-3} = \frac{22}{7}(0.4)^2 h$$

$h = 1.05$ m

hole is at 0.7 m below top, velocity = $V = \sqrt{2 \times 10 \times 0.7}$

$V = \sqrt{14}$

time to hit ground = t

$$t = \sqrt{\frac{2(1.05+0.35)}{10}} = \frac{\sqrt{28}}{10}$$

$$\text{Range} = vt = \sqrt{14}\,\frac{\sqrt{28}}{10}\,m$$

$$= \frac{14\sqrt{2}}{10}\,m = 140\sqrt{2}\ \text{cm}$$

Question ID : 6911211235

35. If 2 mole of an ideal monoatomic gas at temperature T, is mixed with 6 mole of another ideal monoatomic gas at temperature 2T then the temperature of mixture is :

(1) $\frac{5}{2}T$ (2) $\frac{5}{4}T$

(3) $\frac{7}{2}T$ (4) $\frac{7}{4}T$

Ans. Official answer NTA (4)

Sol. $Q_1 + Q_2 = 0$, final temperature $= T_0$

$2(C)(T_0 - T) + 6(C)(T_0 - 2T) = 0$

$2T_0 - 2T + 6T_0 - 12T = 0$

$$T_0 = \frac{7T}{4}$$

Question ID : 6911211236

36. A spring stretches by 2 mm when it is loaded with a mass of 200 g . From equilibrium position the mass is further pulled down by 2 mm and released. The frequency associated with the system and maximum energy in the spring are_____ Hz and _____ J, respectively.

(Take g = 10 m/s^2)

(1) $\frac{5\sqrt{50}}{\pi}$ and 8×10^{-3} (2) $\frac{5\sqrt{50}}{\pi}$ and 8

(3) $10\sqrt{50}$ and 2×10^{-3} (4) $\frac{5\sqrt{50}}{\pi}$ and 16×10^{-3}

Ans. Official answer NTA (1)

Sol. Equilibrium, kx = mg

$k(2 \times 10^{-3}) = (200 \times 10^{-3})(10)$

k = 1000 N/m

$$f = \frac{\omega}{2\pi} = \frac{1}{2\pi}\sqrt{\frac{k}{m}}$$

$$f = \frac{1}{2\pi}\sqrt{\frac{1000}{0.2}} = \frac{5\sqrt{50}}{\pi}\ \text{Hz}$$

maximum energy in spring when it is maximum streched (4 mm)

$$E_{max} = \frac{1}{2}(1000)(4\times10^{-3})^2$$

$= 8 \times 10^{-3}$ J

Question ID : 6911211237

37. The electric potential as a function of x, y is given by $V = 5\left(x^2 - y^2\right)V$. The electric field at a point (2,3) m is V/m.

(1) $(-20\hat{i} + 30\hat{j})$ (2) $(20\hat{i} - 30\hat{j})$

(3) $(20\hat{i} + 45\hat{j})$ (4) $(-4\hat{i} + 6\hat{j})$

Ans. Official answer NTA (1)

Sol. $V = 5x^2 - 5y^2$

$$\vec{E} = -\left[\frac{\delta V}{\delta x}\hat{i} + \frac{\delta V}{\delta y}\hat{j}\right]$$

$$\vec{E} = -10x\hat{i} + 10y\hat{j}$$

at (2, 3)

$$\vec{E} = -20\hat{i} + 30\hat{j}$$

Question ID : 6911211238

38. A current of 30 A each flows in opposite directions in two conducting wires, placed parallel to each other at a distance of 8 cm . The magnetic field at the mid point between the two wires is _____ μT.

$\left(\frac{\mu_o}{4\pi} = 10^{-7}\ N/A^2\right)$

(1) 30 (2) 300

(3) 150 (4) 0.0

Ans. Official answer NTA (2)

Sol. $$B = \frac{2\mu_0 i}{2\pi r} = \frac{2(4\pi \times 10^{-7})30}{2\pi(0.04)}$$

$B = 3 \times 10^{-4}\ T = 300\ \mu T$

Question ID : 6911211239

39. A square loop of side 2 cm is placed in a time varying magnetic field with magnitude as B = 0.4 sin (300 t) Tesla. The normal to the plane of loop makes an angle of 60° with the field. The maximum induced emf produced in the loop is _____ mV .

(1) 12 (2) 18

(3) 21 (4) 24

Ans. Official answer NTA (4)

Sol. $\phi = \vec{B} \cdot \vec{A} = BA\cos\theta$

$= (0.4 \sin (300\ t))\ (0.02)^2 \cos 60°$

$\phi = 8 \sin (300\ t) \times 10^{-5}$

$$\text{emf} = \frac{d\phi}{dt} = 2400 \times 10^{-5} \cos(300\,t)$$

maximum (emf) = 24×10^{-3} V

= 24 mV

Question ID : 6911211240

40. A sphere of capacitance 100 pF is charged to a potential of 100 V . Another identical uncharged metal sphere is brought in contact with the charged sphere, then the change in the total energy stored on these spheres, when they touch is $\alpha \times 10^{-7}$ J . The value of α is _____ .

(combined capacitance of spheres is 200 pF)

(1) 5 (2) $\frac{5}{2}$

(3) $\frac{7}{2}$ (4) $\frac{9}{2}$

Ans. Official answer NTA (2)

Sol. $U_i = \frac{1}{2}CV^2 = \frac{1}{2}\left(10^{-10}\right)\left(100\right)^2 = 5 \times 10^{-7}$ J

when touch, charge will be half-half, i.e potential also be 50 V on each.

$$U_f = 2\left(\frac{1}{2}\left(10^{-10}\right)\left(50\right)^2\right) = \frac{5}{2} \times 10^{-7} \text{ J}$$

$$|\Delta U| = \left|\frac{5}{2} \times 10^{-7} - 5 \times 10^{-7}\right| = \frac{5}{2} \times 10^{-7} \text{ J}$$

$\Rightarrow$ (should be magnitude of change/Loss)

Question ID : 6911211241

41. The energy released if hydrogen atoms are combined to form ${}_2^4\text{He}$ is _____ MeV .

(Take binding energies per nucleon of ${}_1^2\text{H}$ and ${}_2^4\text{He}$ as 1.1 MeV and 7.2 MeV , respectively)

(1) 6.1 (2) 24.4

(3) 26.6 (4) 5

Ans. Official answer NTA (4)

Sol. Released energy = $(B.E)_{Product} - (B.E)_{Reactant}$

$= 4(7.2) - 2(1.1) \times 2 = 24.4$ MeV

Question ID : 6911211242

42. Angle of minimum deviation is equal to the half of the angle of prism in an equilateral prism. The refractive index of the prism is _____ .

(1) 1.5 (2) $\sqrt{3}$

(3) $\sqrt{2}$ (4) 1.65

Ans. Official answer NTA (2)

Sol. $\delta_{min} = 2i - A = \frac{A}{2} \Rightarrow i = \frac{3A}{4} = \frac{3\times 60}{4} = 45°$

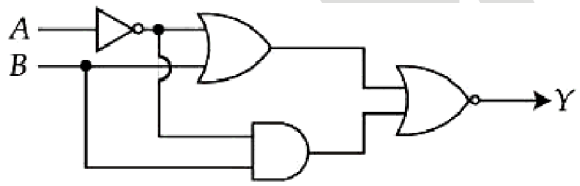
in case of δ_{min}, $r_1 = r_2 = \frac{A}{2} = 30°$

snell's law (1^{st} refraction) $\rightarrow 1\sin 45° = \mu \sin 30°$

$\mu = \sqrt{2}$

Question ID : 6911211243

43. Refer to the logic circuit given below. For two inputs (A = 1, B = 1) and (A = 0, B = 1), output (Y) will be _____ .

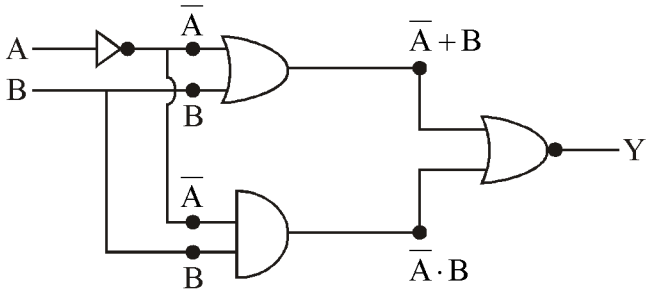


(1) 1, 0 respectively (2) 0, 1 respectively

(3) 0, 0 respectively (4) 1, 1 respectively

Ans. Official answer NTA (3)

Sol.



$Y = \overline{\overline{A} + B + \overline{A}\cdot B} = \overline{\overline{A} + B}\cdot\overline{\overline{A}\cdot B}$

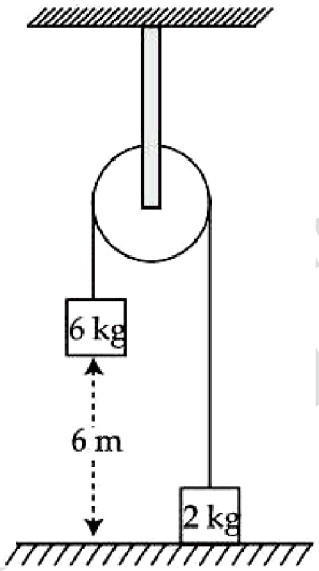
$Y = \left(A\cdot\overline{B}\right)\cdot\left(A+\overline{B}\right)$

$A = 1, B = 1 \Rightarrow Y = (1 \cdot 0) \cdot (1 + 0) = 0 \cdot (1) = 0$

$A = 0, B = 1 \Rightarrow Y = (0 \cdot 0) \cdot (0 + 0) = 0 \cdot 0 = 0$

Question ID : 6911211244

44. The velocity at which 6 kg mass (shown in figure) strikes the ground when it is released from a height of 6 m above the ground is _____ m/s. Assume pulley is massless and string is light and inextensible. (Take $g = 10\ m/s^2$)



(1) 7.74 (2) 7.20

(3) 6.55 (4) 4.50

Ans. Official answer NTA (1)

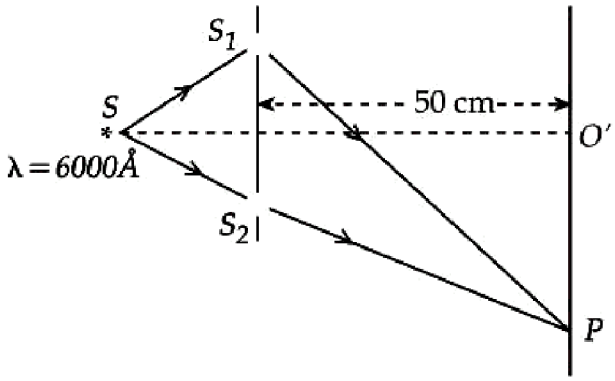
Sol. Apply WET $\Rightarrow \omega_g = \Delta KE$

$$6(10)(6) - 2(10)(6) = \frac{1}{2}(6+2)V^2$$

$$V = \sqrt{60} = 7.74\ m/s$$

Question ID : 6911211245

45. In a Young double slit experiment, the wavelength of incident light is 6000 Å, the separation between slits S_1 and S_2 is 5 cm and the distance between slits plane and screen is 50 cm , as shown in the figure below. If the resultant intensity at P is equal to the intensity due to individual slits, the path difference between interfering waves is _____ Å.



(1) 4000 (2) 3000

(3) 2000 (4) 1000

Ans. Official answer NTA (1, 3)

Sol. $I = I_0 + I_0 + 2\sqrt{I_0}\sqrt{I_0}\cos\phi = I_0$

$$\cos\phi = \frac{-1}{2}$$

$$\phi = 2n\pi \pm \frac{2\pi}{3}, n = 0, 1, 2, ...$$

$$\phi = \frac{2\pi}{\lambda}\Delta x = 2n\pi \pm \frac{2\pi}{3}$$

$$\Delta x = \left(n \pm \frac{1}{3}\right)\lambda,\ \lambda = 6000\ \text{Å}$$

$$n = 0,\ \Delta x = \frac{6000}{3} = 2000\ \text{Å}$$

$$n = 1, \Delta x = \left(1 + \frac{1}{3}\right)6000 = 8000\ \text{Å}$$

or $\left(1 - \frac{1}{3}\right)6000 = 4000\ \text{Å}$

Question ID : 6911211246

46. A block takes t time to slide down a plane inclined at 45° to the horizontal. If the surface is made smooth (frictionless), the block takes time $\frac{t}{2}$ to slide down the plane. The coefficient of friction between the block and the inclined plane is $\left(\frac{\alpha}{100}\right)$. The value of α is _____ .

Ans. Official answer NTA (75)

Sol. $t = \sqrt{\frac{2h}{a}}$

$a \rightarrow$ net acceleratation

$h \rightarrow$ displacement

$$t \propto \frac{1}{\sqrt{a}}$$

$$\frac{t}{\frac{t}{2}} = \sqrt{\frac{g/\sqrt{2}}{\frac{g}{\sqrt{2}} - \mu\frac{g}{\sqrt{2}}}}$$

$$2 = \frac{1}{\sqrt{1-\mu}}$$

$$\mu = \frac{3}{4} = \frac{\alpha}{100} \Rightarrow \alpha = 75$$

Question ID : 6911211247

47. The de Broglie wavelength for an electron accelerated through the potential difference of V_1 volt is λ_1. When the potential difference is changed to V_2 volt, the associated de Broglie wavelength is increased by 50%. If $(V_1 / V_2) = (9/\alpha)$, then the value of α is _____ .

Ans. Official answer NTA (4)

Sol. $\lambda = \frac{h}{P} = \frac{h}{\sqrt{2mKE}} = \frac{h}{\sqrt{2mev}}$

$$\lambda \propto \frac{1}{\sqrt{V}}$$

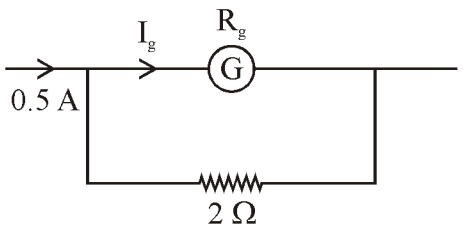
$$\frac{3\lambda/2}{\lambda} = \sqrt{\frac{V_1}{V_2}} \Rightarrow \frac{V_1}{V_2} = \frac{9}{4}$$

Question ID : 6911211248

48. A moving coil of galvanometer when shunted with 2Ω resistance gives a full scale deflection for a current of 500 mA . When a resistance of 470Ω is connected in series it gives a full scale deflection for 10 V potential applied on it. The value of resistance of galvanometer coil is _____ Ω.

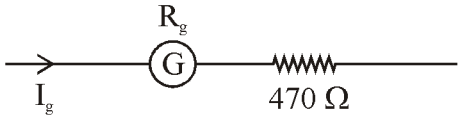
Ans. Official answer NTA (50)

Sol. Ammeter



$I_gR_g = (0.5 - I_g)(2)$ .....(i)

Voltmeter



$I_g(R_g + 470) = 10$ .....(ii)

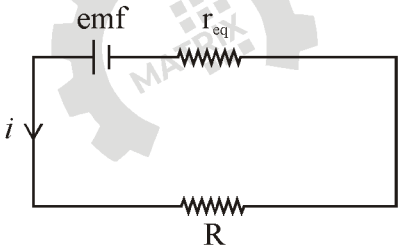
by (i) and (ii) $\Rightarrow R_g = 50\ \Omega$

Question ID : 6911211249

49. Two cells of emfs 1 V and 2 V and internal resistance 2Ω and 1Ω, respectively connected in parallel, gave a current of 1 A through an external resistance. If the polarity of one cell is reversed, then value of current through the external resistance will be $\frac{\alpha}{5}$ A. The value of α is _____ .

Ans. Official answer NTA (3)

Sol.



In same polarity, $\text{emf} = \dfrac{\frac{1}{2}+\frac{2}{1}}{\frac{1}{2}+\frac{1}{1}} = \dfrac{5}{3}$, $\quad r_{eq} = \dfrac{2\times1}{2+1} = \dfrac{2}{3}$

$$i = \frac{5/3}{\frac{2}{3}+R} = 1$$

$R = 1\ \Omega$

if polarity is reversed, $\text{emf} = \dfrac{\frac{-1}{2}+\frac{2}{1}}{\frac{1}{2}+\frac{1}{1}} = 1$, $r_{eq} = \dfrac{2}{3}$

$$i = \frac{\text{emf}}{r_{eq}+R} = \frac{1}{\frac{2}{3}+1} = \frac{3}{5}\ \text{A}$$

Question ID : 6911211250

50. A concave mirror of focal length 10 cm forms an image which is double the size of object when the object is placed at two different positions. The distance between the two positions of the object is _____ cm.

Ans. Official answer NTA (10)

Sol. $M_T = \dfrac{-V}{U} = \pm 2$

if $M_T = +2 \Rightarrow V = -2\,U$

$\dfrac{1}{-2U}+\dfrac{1}{U} = \dfrac{1}{-10} \Rightarrow U_1 = -5\,\text{cm}$

if $M_T = -2 \Rightarrow V = +2\,U$

$\dfrac{1}{2U}+\dfrac{1}{U} = \dfrac{1}{-10} \Rightarrow U_2 = -15\,\text{cm}$

distance $= |U_2 - U_1| = 10$ cm