JEE Main April 2026

Question Paper With Text Solution

04 April | Shift-1

PHYSICS

MATRIX

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

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JEE MAIN APRIL 2026 | 04 APRIL SHIFT-1

SECTION – A

Question ID : 695278251

26. In a screw gauge when the circular scale is given five complete rotations it moves linearly by 2.5 mm. If the circular scale has 100 divisions, the least count of screw gauge is _____ mm.

(1) 1×10^{-2} (2) 1×10^{-3}

(3) 5×10^{-2} (4) 5×10^{-3}

Ans. (4)

Sol. $\text{Pitch} = \frac{2.5}{5} = 0.5\text{mm}$

$\text{Leastcount} = \frac{0.5\text{mm}}{100} = 0.005\text{mm} = 5\times10^{-3}\,\text{mm}$

Question ID : 695278252

27. The increase in the pressure required to decrease the volume (ΔV) of water is 6.3×10^7 N/m^2. The percentage decrease in the volume is _____. (Bulk modulus of water = 2.1×10^9 N/m^2.)

(1) 2 % (2) 3 %

(3) 6 % (4) 4 %

Ans. (2)

Sol. $\%\text{ Decrease in volume} = \left(-\frac{\Delta V}{V}\right)\times100\%$

$= \frac{\Delta P}{\beta}\times100\%$

$= \frac{6.3\times10^7}{2.1\times10^9}\times100\% = 3\%$

Question ID : 695278253

28. The time taken by a block of mass m to slide down from the heighest point to the lowest point on a rough inclined plane is 50 % more compared to the time taken by the same block on identical inclined smooth plane. Both inclined planes are at 45° with the horizontal. The coefficient of kinetic friction between the rough inclined surface and block is _____.

(1) 3/4 (2) 2/3

(3) 5/9 (4) 4/9

Ans. (3)

Sol. For smooth plane, $a_1 = g\sin45° = g/\sqrt{2}$

For rough plane, $a_2 = g(\sin45° - \cos45°) = \frac{g}{\sqrt{2}}(1-\mu)$

It is given that $t_2 = 1.5\ t_1$

So $s = \frac{1}{2}a_1t_1^2 = \frac{1}{2}a_2t_2^2$

$\Rightarrow \frac{g}{\sqrt{2}}t_1^2 = \frac{g}{\sqrt{2}}(1-\mu)(1.5t_1)^2$

$\Rightarrow \mu = (1-\mu)(2.25)$

$\Rightarrow \mu = \frac{1.25}{2.25} = \frac{5}{9}$

Question ID : 695278254

29. Two nuclei of mass number 3 combine with another nucleus of mass number 4 to yield a nucleus of mass number 10. If the binding energy per nucleon for the mass numbers 3, 4 and 10 are 5.6 MeV, 7.4 MeV and 6.1 MeV, respectively, then in the process, ΔMc^2 = _____ MeV.

(1) 6.9 (2) 7.9

(3) 2.2 (4) 4.3

Ans. (3)

Sol. ΔMc^2 = B.E. of product – B.E. of reactants

$= (10 \times 6.1) - [2 \times (3 \times 5.6) + (4 \times 7.4)]$

$= 61 - 63.2$

$= -2.2$ MeV

$\therefore |\Delta Mc^2| = 2.2$MeV

Question ID : 695278255

30. A solid sphere of mass M and radius R is divided into two unequal parts. The smaller part having mass M/8 is converted into a sphere of radius r and the larger part is converted into a circular disc of thickness t and radius 2R. If I_1 is moment of inertia of a sphere having radius r about an axis through its centre and I_2 is the moment of inertia of a disc about its diameter, the ratio of their moment of inertia I_2/I_1 = _____.

(1) 35 (2) 70

(3) 140 (4) 210

Ans. (2)

Sol. For smaller part : $M_1 = \frac{M}{8} \Rightarrow V_1 = \frac{V}{8} \Rightarrow r = \frac{R}{2}$

$$\therefore I_1 = \frac{2}{5}M_1r^2 = \frac{2}{5}\left(\frac{M}{8}\right)\left(\frac{R}{2}\right)^2 = \frac{MR^2}{80}$$

For bigger part $\Rightarrow M_2 = \frac{7M}{8}, r' = 2R$

$$\therefore I_2 = \frac{M_2(2R)^2}{4} = \frac{\frac{7M}{8}\left(4R^2\right)}{4} = \frac{7}{8}MR^2$$

$$\therefore \frac{I_2}{I_1} = \frac{\frac{7}{8}MR^2}{\frac{MR^2}{80}} = 70$$

Question ID : 695278256

31. The two projectiles are projected with the same initial velocities at the 15° and 30° with respect to the horizontal. The ratio of their ranges is 1 : x. The value of x is :

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

(3) $2\sqrt{3}$ (4) $\frac{1}{\sqrt{2}}$

Ans. (2)

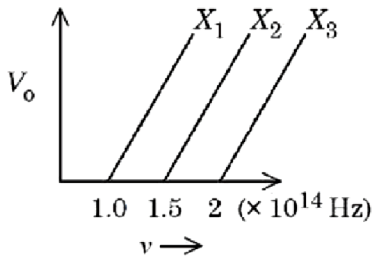
Sol. Range (R) α sin2θ

$$\therefore \frac{R_1}{R_2} = \frac{\sin(2\times15)}{\sin(2\times30)} = \frac{\frac{1}{2}}{\sqrt{3}/2} = \frac{1}{\sqrt{3}} = \frac{1}{x}$$

$$\therefore x = \sqrt{3}$$

Question ID : 695278257

32. The graph shows variation of stopping potential V_0 with the frequency ν of the incident radiation for three photosensitive metals X_1, X_2 and X_3. Which metal will give out electrons with greater kinetic energy, for the same wavelength of incident radiation ?



(1) X_1

(2) X_2

(3) X_3

(4) All the metals will give out photo electrons with same kinetic energies

Ans. (1)

Sol. We know that $K_{max} = h\nu - \phi$

$\nu \rightarrow$ Same

$\therefore \phi \downarrow \Rightarrow K_{max} \uparrow$

$\therefore$ Ans is X_1

Question ID : 695278258

33. A slit of width a is illuminated by light of wavelength λ. The linear separation between 1st and 3rd minima in the diffraction pattern produced on a screen placed at a distance D from the slit system is _____.

(1) $\frac{D\lambda}{a}$

(2) $1.5\frac{D\lambda}{a}$

(3) $2\frac{D\lambda}{a}$

(4) $3\frac{D\lambda}{a}$

Ans. (3)

Sol. Distance between 1st & 3rd minima = $y_3 - y_1$

$= \frac{3\lambda D}{a} - \frac{\lambda D}{a}$

$= \frac{2D\lambda}{a}$

Question ID : 695278259

34. A string A of length 0.314 m and Young's modulus 2×10^{10} N/m^2 is connected to another string B of length and Young's modulus both twice of those of A. This series combination of strings is then suspended from a rigid support and its free end is fixed to a load of mass 0.8 kg. The net change in length of the combination is _____mm.

(radius of both the strings is 0.2 mm and acceleration due to gravity = 10 m/s^2)

(Mass of both strings is to be neglected as compared to the mass of load)

(1) 3

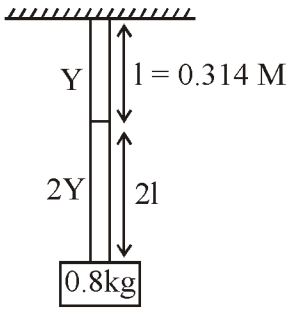
(2) 2

(3) 1.9

(4) 1

Ans. (2)

Sol.



Using $\Delta L = \frac{FL}{AY}$

Where $F = Mg = 0.8 \times 10 = 8$ N

$$\therefore \Delta L_1 = \frac{8 \times 0.314}{3.14 \times \left(2 \times 10^{-4}\right)^2 \times 2 \times 10^{10}} = 10^{-3} = 1\text{mm}$$

and $\Delta L_2 = \frac{F(2L)}{A(2Y)} = \frac{FL}{AY} = \Delta L_1 = 1\text{mm}$

$\therefore$ Total extension = 1 + 1 = 2 mm

Question ID : 695278260

35. One gas of n_1 mole of molecules at temperature T_1, volume V_1, and pressure P_1, and another gas of n_2 mole of molecules at temperature T_2, volume V_2, and pressure P_2, are mixed resulting in pressure P and volume V of the mixture. The temperature of the mixture is _____.

(1) $(T_1 + T_2)/2$ (2) $T_1T_2PV/(T_2P_1V_1 + T_1P_2V_2)$

(3) $(T_2P_1V_1 + T_1P_2V_2)/(T_1T_2PV)$ (4) $|T_1 - T_2|/2$

Ans. (2)

Sol. For mixture, $n = n_1 + n_2$

and $T = \frac{PV}{nR} = \frac{PV}{(n_1 + n_2)R}$ (Where $n_1 = \frac{P_1V_1}{RT_1}$ & $n_2 = \frac{P_2V_2}{RT_2}$)

$$\Rightarrow T = \frac{PV}{\frac{P_1V_1}{T_1} + \frac{P_2V_2}{T_2}}$$

$$\Rightarrow T = \frac{PVT_1T_2}{P_1V_1T_2 + P_2V_2T_1}$$

Question ID : 695278261

36. An ideal gas undergoes a process maintaining relation between pressure (P) and volume (V) as $P = P_0\left(1+\left(\frac{V_0}{V}\right)^2\right)^{-1}$, where P_0 and V_0 are constants. If two samples A and B (two moles each) with initial volumes V_0 and $3V_0$ respectively undergo above mentioned process and attain same pressure, then the difference at the temperatures of these samples, $T_B - T_A$ is _____. (R = gas constant)

(1) $\frac{9P_0V_0}{8R}$ (2) $\frac{11P_0V_0}{10R}$

(3) $\frac{7P_0V_0}{6R}$ (4) $\frac{13P_0V_0}{11R}$

Ans. (2)

Sol. For A $\Rightarrow$

$V_A = V_0$

$$\therefore P_A = P_0\left[1+\left(\frac{V_0}{V_0}\right)^2\right]^{-1} = \frac{P_0}{2}$$

$$\therefore T_A = \frac{\left(\frac{P_0}{2}\right)V_0}{2R} = \frac{P_0V_0}{4R}$$

For B $\Rightarrow$

$V_B = 3V_0$

$$\therefore P_B = P_0\left[1+\left(\frac{V_0}{3V_0}\right)^2\right]^{-1} = P_0\left[1+\frac{1}{9}\right]^{-1} = \frac{9P_0}{10}$$

$$\therefore T_B = \frac{\left(\frac{9P_0}{10}\right)(3V_0)}{2R} = \frac{27P_0V_0}{20R}$$

Therefore, $T_B - T_A = \frac{P_0V_0}{4R}\left[\frac{27}{5}-1\right] = \frac{22P_0V_0}{20R}$

$$= \frac{11P_0V_0}{10R}$$

Question ID : 695278262

37. A voltmeter with internal resistance of x Ω can be used to measure upto 20 V. In order to increase its measuring range to 30 V, the required modification is to _____.

(1) connect resistor of $\frac{x}{2}\Omega$, in series with voltmeter.

(2) connect resistor of $\frac{x}{2}\Omega$, in parallel to voltmeter.

(3) connect a resistor of x Ω in series with voltmeter.

(4) connect resistor of 2x Ω in parallel to voltmeter.

Ans. (1)

Sol. Range of voltmeter = $i_g \times R_V$

$20 = i_g x$ .....(1)

$30 = i_g x'$ .....(2)

From (1) & (2)

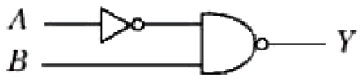
$\frac{x'}{x} = \frac{3}{2} \Rightarrow x' = \frac{3}{2}x$

$\because$ Resistance should be increased. So extra resistance should be connected in series.

$\therefore$ Extra resistance = $x' - x = \frac{x}{2}$

Question ID : 695278263

38. Two 4 bits binary numbers, A = 1101 and B = 1010 are given in the inputs of a logic circuit shown in figure below. The output (Y) will be :



(1) Y = 1101 (2) Y = 0010

(3) Y = 0111 (4) Y = 1000

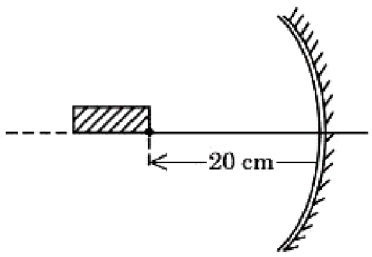
Ans. (1)

Sol. Truth table :–

A	B	Y
1	1	1
1	0	1
0	1	0
1	0	1

Question ID : 695278264

39. A rod of length 10 cm lies along the principle axis of a concave mirror of focal length 10 cm as shown in figure. The length of the image is _____ cm.



(1) 2.5 (2) 5

(3) 7.5 (4) 7

Ans. (2)

Sol. One end of rod is at centre of curvature, so its image will be at centre of curvature

$\therefore v_1 = -20$ cm

For other end $\Rightarrow \frac{1}{v}+\frac{1}{u}=\frac{1}{f}$

$\Rightarrow \frac{1}{v_2}+\frac{1}{-30}=\frac{1}{-10}$

$\Rightarrow v_2 = -15$cm

$\therefore$ Length of image $= |v_2 - v_1| = 5$cm

Question ID : 695278265

40. A parallel plate air capacitor is connected to a battery. The plates are pulled apart at uniform speed v. If x is the separation between the plates at any instant, then the time rate of change of electrostatic energy of the capacitor is proportional to x^{α}, where α is _____.

(1) –2 (2) 1

(3) –1 (4) 2

Ans. (1)

Sol. At any instant, $C = \frac{\epsilon_0 A}{x}$

$\therefore U = \frac{1}{2}Cv^2 = \frac{\epsilon_0 Av^2}{2x^2}$

$\therefore \frac{dU}{dx} = \frac{\epsilon_0 Av^2}{2}\left(-\frac{1}{x^2}\right)\frac{dx}{dt}$ Where $\frac{dx}{dt} = v \rightarrow$ Constant

$\Rightarrow \frac{dU}{dx} \alpha \frac{1}{x^2} \alpha x^{-2}$

$\therefore a = -2$

Question ID : 695278266

41. An insulated wire is wound so that it forms a flat coil with N = 200 turns. The radius of the innermost turn is r_1 = 3 cm, and of the outermost turn r_2 = 6 cm. If 20 mA current flows in it then the magnetic moment will be $\alpha \times 10^{-2}$ A.m^2. The value of α is _____.

(1) 4.4 (2) 2.64

(3) 3.25 (4) 1.2

Ans. (2)

Sol. $m = \int_{r_1}^{r_2} I(\pi r^2)\left[\frac{N}{r_2 - r_1} \times dr\right]$

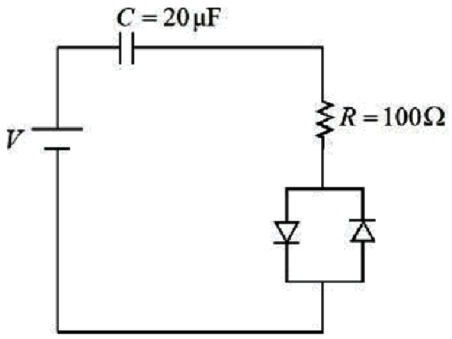
$\Rightarrow m = \frac{NI\pi}{r_2 - r_1}\int_{r_1}^{r_2} r^2 dr = \frac{NI\pi}{r_2 - r_1}\left[\frac{r_2^3 - r_1^3}{3}\right]$

$\Rightarrow m = \frac{200 \times (20 \times 10^{-3})\pi}{0.06 - 0.03} \times \left[\frac{(0.06)^2 - (0.03)^2}{3}\right]$

$\Rightarrow m = 2.64 \times 10^{-2}$ A.m^2

Question ID : 695278267

42. Consider a circuit consisting of a capacitor (20 μF), resistor (100 Ω) and two identical diodes as shown in figure. The resistance of diode under forward biasing condition is 10 Ω. The time constant of the circuit is $\alpha \times 10^{-3}$ s. The value of α is _____.



(1) 2.2 (2) 2.0

(3) 2.1 (4) 2.4

Ans. (1)

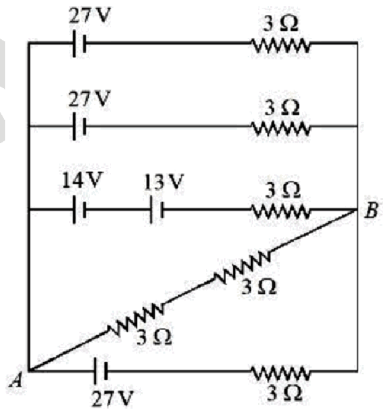
Sol. Req. = 100 + 10 = 110 Ω

$\therefore$ Time constant = Req. C = $110 \times 20 \times 10^{-6}$

$= 2.2 \times 10^{-3}$

Question ID : 695278268

43. The voltage and the current between A and B points shown in the circuit are _____.

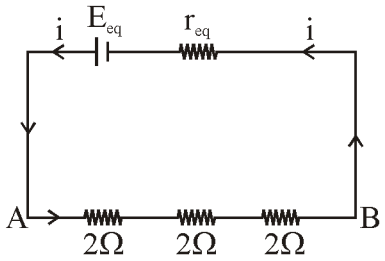


(1) 24 V, 12 A (2) 24 V, 4 A

(3) 18 V, 12 A (4) 27 V, 4 A

Ans. (2)

Sol.



$$E_{eq}=\frac{\frac{27}{3}+\frac{27}{3}+\frac{27}{3}+\frac{27}{3}}{\frac{1}{3}+\frac{1}{3}+\frac{1}{3}+\frac{1}{3}}=27\text{volt}$$

$$\frac{1}{r_{eq}}=\frac{4}{3}\Rightarrow r_{eq}=\frac{3}{4}\Omega$$

$$\therefore R_{eq}=2+2+2+r_{eq}=6+\frac{3}{4}=\frac{27}{4}$$

$$\therefore i=\frac{E_{eq}}{R_{eq}}=\frac{27}{\left(\frac{27}{4}\right)}=4A$$

& $V_A - V_B = 6 \times 4 = 24$ volt

Question ID : 695278269

44. A telescope with objective diameter R is used to observe a distant star emitting light of wavelength 500 nm, at a resolution of 5×10^{-7} radian. The value of R is _____ cm.

(1) 61 (2) 122

(3) 244 (4) 305

Ans. (2)

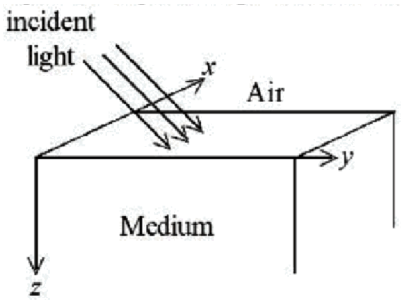
Sol. Reslution angle $(\Delta\theta) = \frac{1.22\lambda}{R}$

$$\Rightarrow R=\frac{1.22\lambda}{\Delta\theta}=\frac{1.22\times500\times10^{-9}}{5\times10^{-7}}=1.22\text{ m}$$

$\Rightarrow R = 122$ cm

Question ID : 695278270

45. An unpolarized light is incident on the plane interface of air-dielectric medium shown in figure. If the incident angle is equal to Brewster angle, identify the expression representing reflected wave.



(1) $\left(E_x\hat{i}+E_y\hat{j}\right)\sin(kx-kz-\omega t)$

(2) $\left(E_x\hat{i}+E_z\hat{k}\right)\sin(kx+ky-\omega t)$

(3) $\left(E_x\hat{j}+E_y\hat{k}\right)\sin(ky+kz-\omega t)$

(4) $\left(E_x\hat{i}+E_y\hat{j}+E_z\hat{k}\right)\sin(kx+ky-kz-\omega t)$

Ans. (1)

Sol. The light is propagating along the positive z-axis and its is reflected from plane then correct phase for reflected light is kx – kz – ωt and for electric field as the light incident on Brewster angle so the reflected light should be perfectly plane polarized that's why polarization direction should be y-axis so electric field of reflected light contain no z-component.

Question ID : 695278271

46. A 1 kg block subjected to two simultaneous forces $\left(2\hat{i}+3\hat{j}+4\hat{k}\right)$N and $\left(3\hat{i}-\hat{j}-2\hat{k}\right)$N is moved a distance of 25 m along $\left(3\hat{i}-4\hat{j}\right)$ direction. The work done in this process is _____J.

Ans. (35)

Sol. $\vec{F}_{net}=\vec{F}_1+\vec{F}_2=\hat{i}(2+3)+\hat{j}(3-1)+\hat{k}(4-2)$

$\vec{F}_{net}=5\hat{i}+2\hat{j}+2\hat{k}\rightarrow$ Constant

and $\vec{S}=25\times\hat{S}=25\times\left(\frac{3\hat{i}+4\hat{j}}{5}\right)$

$\vec{S}=15\hat{i}-20\hat{j}$

$\therefore$ Work done $=\vec{F}.\vec{S}=(5)(15)+(2)(-20)+(2)(0)$

$= 75 - 40 + 0$

35 Joule

Question ID : 695278272

47. The surface tension of a soap solution is 3.5×10^{-2} N/m. The work required to increase the radius of a soap bubble from 1 cm to 2 cm is $\alpha \times 10^{-6}$ J. The value of α is _____. ($\pi = 22/7$)

Ans. (264)

Sol. Work required $= 2 \times T \times \Delta A = 2T\left[4\pi\left(r_f^2 - r_i^2\right)\right]$

$= 2 \times 3.5 \times 10^{-2} \times 4 \times \frac{22}{7}[4-1] \times 10^{-4}$

$= 264 \times 10^{-6}$ Joule

Question ID : 695278273

48. The velocity of a particle executing simple harmonic motion along x-axis is described as $v^2 = 50 - x^2$, where x represents displacement. If the time period of motion is $\frac{x}{7}$ s, the value of x is _____.

Ans. (44)

Sol. From S.H.M we know that,

$v^2 = \omega^2(A^2 - x^2)$

$\therefore$ On comparisian with given equation

$\omega = 1\frac{\text{Rad}}{\text{See}}$

$\therefore T = \frac{2\pi}{1} = 2\pi = \frac{x}{7}$

$\therefore x = 14\pi = 14 \times \frac{22}{7} = 44$

Question ID : 695278274

49. A body of mass 2 kg begins to move under the influence of time dependent force $\vec{F} = \left(2t\hat{i} + 6t^2\hat{j}\right)$N, where $\hat{i}$ and $\hat{j}$ are unit vectors along x and y-axis respectively. The power produced by the force at t = 2 s is _____W.

Ans. (200)

Sol. $\bar{a} = \frac{\bar{F}}{m} = \frac{2t\hat{i} + 6t^2\hat{j}}{2} = t\hat{i} + 3t^2\hat{j}$

$\therefore \bar{v} = \int \bar{a}dt = \frac{t^2}{2}\hat{i} + t^3\hat{j}$

$\therefore \text{Power, } P = \bar{F}.\bar{v} = (2t)\left(\frac{t^2}{2}\right) + \left(6t^2\right)t^3$

$\Rightarrow P = t^3 + 6t^5$

At $t = 2$ sec

$\Rightarrow P = (2)^3 + 6\,(2)^5 = 8 + 6\,(32) = 200$

Question ID : 695278275

50. An inductor of 10 mH, capacitor of 0.1 μF and a resistor of 100 Ω are connected in series across an a.c power supply 220 V, 70 Hz. The power factor of the given circuit is 0.5. The difference in the inductive reactance and capacitance reactance is $\sqrt{3}\,\alpha\,\Omega$. The value of α is _____.

Ans. (100)

Sol. $\cos\phi = 0.5 \Rightarrow \phi = 60°$

$$\therefore \tan 60° = \frac{|X_L - X_C|}{R}$$

$$\Rightarrow |X_L - X_C| = \sqrt{3}R = \sqrt{3}(100)$$

$$\therefore \alpha = 100$$