JEE-Main-01-02-2024 (Memory Based)
[MORNING SHIFT]

Physics

Question: The dimensions of angular impulse is equal to:
Options:
(a) $[ML^2T^{-1}]$
(b) $[ML^2T]$
(c) $[ML^2T^2]$
(d) $[MLT^{-1}]$
Answer: (a)

Question: A vernier caliper has 10 main scale divisions coinciding with 11 vernier scale division equals 5 mm. The least count of the device is:
Options:
(a) $\frac{1}{2}mm$
(b) $\frac{5}{12}mm$
(c) $\frac{5}{11}mm$
(d) 0.3 mm
Answer: (c)

Question: On increasing temperature, the elasticity of a material:
Options:
(a) Increases
(b) Decreases
(c) Remains constant
(d) May increase or decrease
Answer: (b)

Question: Determine the lowest energy of photon emitted in Balmer Series of hydrogen atom.
Options:
(a) 10.02 eV
(b) 1.88 eV
(c) 1.65 eV
(d) 2.02 eV
Answer: (b)

Question: De Broglie wavelength of proton = λ and that of an α particle is 2λ. The ratio of velocity to proton to that of α particle is:
Options:
(a) 8

(b) ⅛
(c) 4
(d) ¼
Answer: (b)

Question: 2 moles of a monatomic gas and 6 moles of a diatomic gas are mixed. Molar specific heat for constant volume of the mixture shall be___
(R is the universal gas constant)
Options:
(a) 1.75 R
(b) 2.25 R
(c) 2.75 R
(d) 2.50 R
Answer: (b)

Question: A gas undergoes a thermodynamics process from state (P_1, V_1, T_1) to state (P_2, V_2, T_2). For the given process $PV^{3/2}$ = constant, find the work done by the gas
Options:
(a) $\frac{P_2V_2 - P_1V_1}{2}$
(b) $\frac{P_1V_1 - P_2V_2}{2}$
(c) $\frac{3(P_1V_1 - P_2V_2)}{2}$
(d) $2(P_1V_1 - P_2V_2)$
Answer: (d)

Question: Two particles each of mass 2 kg are places as shown in x - y plane. If the distance of centre of mass from origin is $\frac{4\sqrt{2}}{x}$, find x:

Options:
Answer: ($x = 2$)

Question: A bullet of mass 10^{-2} kg and velocity 200 m/s gets embedded inside the bob of mass 1 kg of a simple pendulum. The max. Height that the system rises by is___ cm.
Options:
Answer: (20)

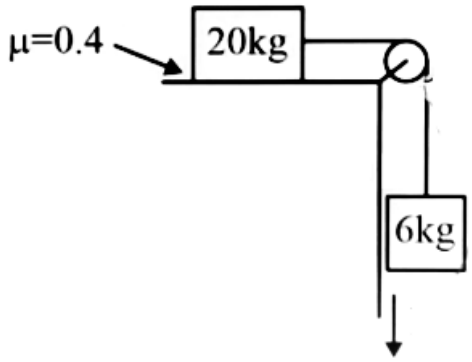
Question: The length of a seconds pendulum if it is placed at height 2R from the surface of the earth
(R : radius of earth) is $\frac{10}{x\pi^2}m$. Find x.

Options:
Answer: (9)

Question: Find percentage change in capacitance if potential difference across it has been changed from V to 2V.
Options:

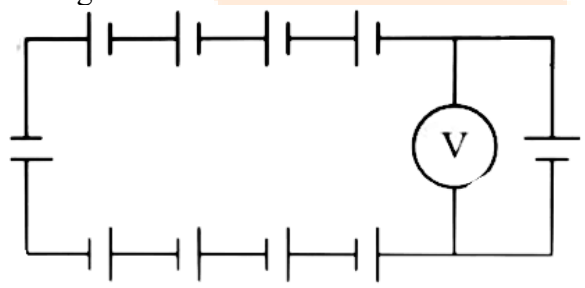
(a) 0
(b) 1.5
(c) 3
(d) 6
Answer: (a)

Question: Find acceleration of the system if an external force of 60 N is applied on 6 kg block as shown.



Options:
(a) $\frac{20}{13} m/s^2$
(b) $\frac{20}{12} m/s^2$
(c) $\frac{20}{14} m/s^2$
(d) $\frac{20}{16} m/s^2$
Answer: (a)

Question: All batteries are identical (5V, 0.2 Ω) and connected as shown in figure find the reading of voltmeter.



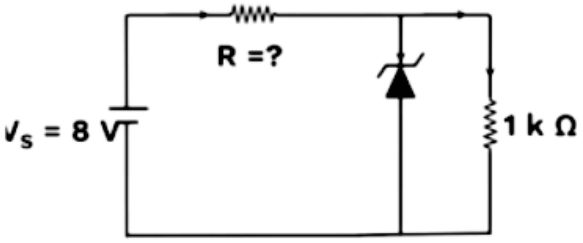
Options:
(a) -20 V
(b) -10 V
(c) 10 V
(d) 0 V
Answer: (d)

Question: Find velocity when acceleration is 0
$x = -3t^3 + 18t^2 + 16t$
Options:

(a) 46 m/s
(b) 52 m/s
(c) 25 m/s
(d) 100 m/s
Answer: (b)

Question: In a series LCR circuit if capacitance is changed from C to 4C. How should the inductance be changed so that circuit has same resonant frequency as before.
Options:
(a) Reduced by L/4
(b) Reduced by 3L/4
(c) Reduced by L/2
(d) Reduced by L
Answer: (b)

Question: Breakdown voltage of Zener diode is 5V. Lower consumed across zener is 20 mW



Options:
(a) 5 kΩ
(b) 3/7 kΩ
(c) 10 kΩ
(d) 5/7 kΩ
Answer: (b)

Question: $I = 3t^2 + 4t^3$. Determine charge passing through in $t = 1$ to $t = 2$ sec.
Options:
(a) 20
(b) 21
(c) 22
(d) 23
Answer: (c)

Question: Find magnetic field at the centre of a hexagonal loop of total length 4π carrying current of $4\sqrt{3}\pi$.
Options:
(a) 72×10^{-7}
(b) 60×10^{-7}
(c) 72×10^{-5}
(d) 60×10^{-6}
Answer: (a)

Question: Two identical charged masses (density = 1.5 g/cc) are suspended from two strings from a common point are is equilibrium in air at angle θ with vertical. If setup is immersed in water and angle remains same find K of medium.

Options:

(a) 1

(b) 2

(c) 3

(d) 4

Answer: (c)

Question: Radius of a nucleus is 4.8 fermi and mass no. is 64. Find atomic mass of nucleus of radius 4 fermi.

Options:

Answer: (27)