JEE-Main-29-01-2024 (Memory Based)
[MORNING SHIFT]

Physics

Question: A block of mass 100 kg is moved along a horizontal surface 10 m from the starting point. If coefficient of friction between ground and the block is 0.4 find work done against friction

Options:

(a) 3.9 kJ

(b) 4.2 kJ

(c) 3.7 kJ

(d) 4.1 kJ

Answer: (a)

Question: A particle is executing SHM with an amplitude A. If potential energy of the system is zero about mean position $x = 0$, Find ratio of total energy to kinetic energy at x = A/3

Options:

(a) 8/9

(b) 9/8

(c) $3/2\sqrt{2}$

(d) $2\sqrt{2}/3$

Answer: (b)

Question: i = 20 + 3/2 t Find charge flown in 20 S

Options:

(a) 1600 C

(b) 1200 C

(c) 1000 C

(d) 800 C

Answer: (c)

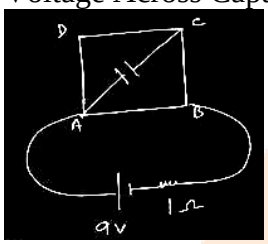
Question: Match the following

A	$\oint \underline{B} \cdot d\underline{A} = 0$	P	Faraday & Lenz's law
B	$\oint \underline{E} \cdot d\underline{A} = \frac{Qin}{\varepsilon_0}$	Q	Gauss law on magnetism
C	$\oint \underline{B} \cdot d\underline{l} = \mu . i_{enc}$	R	Ampere's law

D	$\oint \underline{E} \cdot d\underline{l} = -\frac{d\phi_B}{dt}$	S	Gauss law of electrostatics

Options:
(a) (A-Q),(B-S), (C-R), (D-P)
(b) (A-S),(B-Q), (C-R), (D-P)
(c) (A-Q),(B-R), (C-S), (D-P)
(d) (A-Q),(B-S), (C-P), (D-R)
Answer: (a)

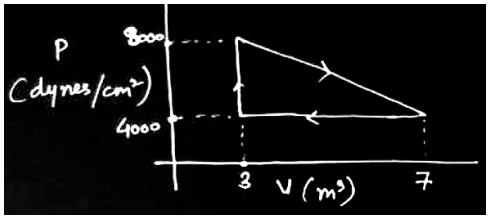
Question: In the Following Circuit the resistance of square loop ABCD is 16 Ohm. Find the Voltage Across Capacitor in steady State



Options:
(a) 4.5 V
(b) 4 V
(c) 3 V
(d) 1 V
Answer: (a)

Question: A Square loop of side 0.1 m is in East West Plane and magnetic field is along North East of 0.2 T. If B is Removed in 10 s find EMF Induced?
Options:
(a) 14 mV
(b) 0.14 mV
(c) 1 mV
(d) 0.2 mV
Answer: (b)

Question: If debroglie wavelength of an electron is same as wavelength of a photon and speed of the electron is 25% of speed of EM waves in vacuum. Find ratio of kinetic energy of electron & energy of photon.
Options:
(a) 1/8
(b) ¼
(c) ½
(d) 1
Answer: (a)
Question: P-V graph of a gas is given. Find the work done by the gas.



Options:
(a) 400 J
(b) 600 J
(c) 800 J
(d) 100 J
Answer: (c)

Question: A convex lens made of glass (μ glass = 1.5) has focal length of 20 cm in air If this lens is put inside a fluid of refractive index 1.6. The new focal length will be
Options:
(a) 160 cm
(b) -160 cm
(c) -180 cm
(d) 80 cm
Answer: (b)

Question: If R is the radius of Earth's and Particle has Equal weight at "d" distance below the surface of Earth's and "d" distance above it, find "d"
Options:
(a) $d = \sqrt{5}\ R/2$
(b) $d = \sqrt{3}\ R$
(c) $d = (\sqrt{5}-1)\ R/2$
(d) $d = R$
Answer: (c)

Question: The flow speeds on upper & lower surfaces of the wings are 70 m/s & 64 m/s respectively on an airplane in a wind tunnel. What is the lift force on the wing? Area of wing is 0.2 m^2 Given: density of air = 1.2 kg/m^3
Options:
(a) 16
(b) 36
(c) 81
(d) 144
Answer: (c)

Question: In a concave mirror of radius of curvature R = 30 cm the size of inverted image is half the size of object. Find the distance of the object from pole.
Options:
(a) 30
(b) 45
(c) 60
(d) 20
Answer: (b)

Question: A Galvanometer shows deflection corresponding to 25 division when a certain current is passed. The deflection becomes 5 divisions when galvanometer is shunted with 24Ω. Find the resistance of galvanometer

Options:

(a) 24 Ω

(b) 48 Ω

(c) 96 Ω

(d) 120 Ω

Answer: (c)

Question: In the given nuclear reaction, which of the following expression correctly represent the Q value

$^{6}_{3}\text{Li} + {}^{2}_{1}\text{H} \rightarrow 2\,{}^{4}_{2}\text{He}$

Given masses:

$^{6}_{3}$Li = 6.015122 amu, $^{4}_{2}$He = 4.00 2603 amu

$^{2}_{1}$H - 2.014101 amu, 1 amu = 931.5 MeV

Options:

(a) 22.37 MeV

(b) 21.42 MeV

(c) 22.02 MeV

(d) 21.90 MeV

Answer: (a)

Question: S1: When a capillary tube is dipped in cold water and then hot water, the height of water increases

S2: When a capillary tube is dipped in hot water and then cold water, the height of water decreases

[Assume negligible change in density of water or radius of capillary]

Options:

(a) 1 true, 2 false

(b) 1 false, 2 true

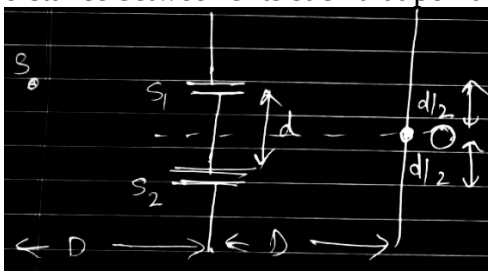
(c) Both false

(d) Both True

Answer: (c)

Question: In YDSE experiment source is placed exactly in front of one slit.

The distance between slits & screen is 0.2m. Wavelength used is 400 nm. Find the minimum distance between slits such that point O is dark



Options:

(a) 0.28 mm

(b) 0.36 mm

(c) 0.14 mm
(d) 0.49 mm
Answer: (a)

Question: A galvanometer with resistance $R_g = 8\Omega$ has a fall scale deflection current of $I_g = 3$ mA. What is the shunt resistance required to create an ammeter of 8 ampere range?
Options:
(a) 0.001 Ω
(b) 0.003 Ω
(c) 0.009 Ω
(d) 0.01 Ω
Answer: (b)

Question: Calculate the flux passing through a sphere of radius 4a whose center is at the origin, if two changes 5q and -2q are placed at
(2q, 0) and (-5q, 0) respectively
Options:
(a) $5q/\varepsilon_0$
(b) $-2q/\varepsilon_0$
(c) $7q/\varepsilon_0$
(d) $3q/\varepsilon_0$
Answer: (a)

Question: If the magnetic potential due to a small magnetic dipole along the axis at a distance of 20 cm is 1.5×10^{-5} J Am^{-1} find its magnetic dipole moment
Options:
(a) 4 Am^2
(b) 6 Am^2
(c) 8 Am^2
(d) 2 A^2
Answer: (b)