JEE Mains 2024 Shift 1 Question Paper (30 January)

Candidates can discover below the memory-based questions for JEE Main 30 Jan 2024 Shift 1 of each subject.

JEE Mains 2024 30 January Shift 1 Physics

Q. If two rings of equal radius R are arranged perpendicular to each other with a common center at C and the rings carry an equal current I, then find the magnetic field at C.

Q. A particle of mass m is projected from the ground with a speed u at an angle of 30° with the horizontal. Find its angular momentum about the point of projection when it reaches its maximum height.

Q. Young's modulus of a material of length L. and cross sectional area A Is Y. If the length is doubled and cross-sectional area is halved then young's modulus will be
A)Y/4
b) 4Y
C) Y
d) 2Y

Q. Find the ratio of the kinetic energy and the potential energy in the 5th excited state of a hydrogen atom.

Q. Find the acceleration of a 2 kg block on a fixed inclined surface at 37° with the horizontal. The block is tied with a rope that passes over two pulleys (represented through a diagram) such that pulley 1 rests at the top of the inclined surface and pulley 2 carries a weight of 4 kg. Neglect friction.

Q, Two current-carrying rings of radius R are mutually perpendicular and their center coincides. Find the magnetic field at center 'O'.

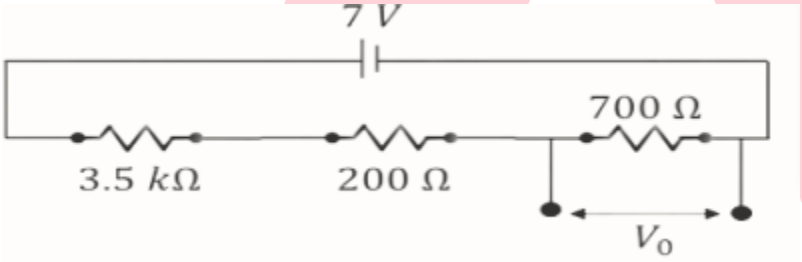
Q. The work function of a metal is 3 eV. Find its threshold wavelength.

Q. A particle of mass m is projected from ground with speed u at an angle of 30° with the horizontal. Find its angular momentum about the point of projection when it reaches its maximum height.
A. $mv^3/16g$
B. $\sqrt{mv}/16g$
C. $mv^3/3g$
D. $\sqrt{3}mv^3/16g$

Q. The ratio of KE : PE IN 5th excited state of hydrogen atom is
A. -2
B. 2
C. -½
D. 1/2

Q.Find the potential difference V0 across the 700 Ω resistance.

A diagram was given in which three resistances 3.5 kΩ, 200 Ω, and 700 Ω are connected in series across a 7 V battery.



A. 2V
B. 0.5V
C. 1.1V
D. Zero

Q. In a convex lens, the distance between the object and the image is 45 cm, and the magnification produced by the lens is two. Find the focal length of the lens.
Q. A particle of mass m is projected at an angle of 30° with initial velocity u. Find its angular momentum about the point of projection at maximum height.

Q. At which temperature the r.m.s velocity of hydrogen molecule is equal to that of oxygen molecule at 47°C

JEE Mains 2024 30 January Shift 1 Chemistry

Q. Identify the given reaction.
$C_6H_6–C=O–Cl \rightarrow$ (in the presence of H_2 , $Pd/BaSO_4$) $\rightarrow$ Product
i. Etard Reaction
ii. Stephen's Reaction
iii. Wolff Kishner Reduction
iv. Rosenmund Reaction

Q. Find out the maximum number of hybrid orbitals formed when 2s and 2p orbitals are mixed.

Q. Find out the sum of the coefficients of all the species involved in the balanced equation:
$2MnO_4^- + I^- \rightarrow$ (in the presence of a slightly alkaline medium) $\rightarrow$ Product

Q. What is the geometry of Aluminium chloride in an aqueous solution?
i. Square planar
ii. Octahedral
iii. Tetrahedral
iv. Square pyramidal

Q. If a 250 mL solution of CH_3COONa of molarity 0.35 M is to be prepared, what is the mass of CH_3COONa required in grams? Round off the answer to the nearest integer.

Q. Match the following:

Column I	Column II
i. BrF_5	a. Sea-Saw
ii. H_2O	b. T-Shape
iii. ClF_3	c. Bent
iv. SF_4	d. Square Pyramidal

Q. Which of the following sets contain both diamagnetic ions?
i. Ni^{2+}, Cu^{2+}

ii. Eu3+, Gd3+
iii. Cu+, Zn2+
iv. Ce4+, Pm3+

Q. Which of the given compounds will not give the Fehling test?
i. Lactose
ii. Maltose
iii. Sucrose
iv. Glucose

Q . Statement I: For hydrogen atoms, 3p and 3d are degenerate.
Statement II: Degenerate orbitals have the same energy.
i. Both statements I and II are correct.
ii. Both statements I and II are incorrect.
iii. Statement I is correct and statement II is incorrect.
iv. Statement I is incorrect and statement II is correct.

Q. Identify the correct structure for the compound named "3-Methylpent-2-enal" as per IUPAC nomenclature.

Q . Find the final product when C6H6–Br reacts with i. Mg, Dry Ether, ii. CO2, H+, iii. NH3, heat, and iv. Br2, KOH

Q. The number of atoms in a silver plate having an area of 0.05 cm2 and a thickness of 0.05 cm is m x 1019. If the density of silver is 7.9 g/cm3, find the value of m.
Q. What is the group number of unununnium?

Q. Identify the correct structure for the compound named "3-Methylpent-2-enal" as per IUPAC nomenclature.

JEE Mains 2024 30 January Shift 1 Mathematics

Q, If the length of the minor axis of an ellipse is equal to half of the distance between the foci, then the eccentricity of the ellipse is.

Q. Let A(2,3,5) and C(- 3, 4, - 2) be 'opposite vertices of a Parallelogram ABCD. If the diagonal vec BD = hat i +2 hat j +3 hat k then the area of the Parallelogram is equal to.

Q. Let (α, β, y) be the foot of perpendicular form the point (1,2,3) on the line (x + 3)/5 = (y - 1)/2 = (z + 4)/3 then 19 (α+ β+ y)Q. If z = x + iy, xy ≠ 0 satisfies the equation $z^2 + iz = 0$, then $|z^2|$; equal to

Q. Let A(2,3,5) and C(- 3, 4, - 2) be 'opposite vertices of a Parallelogram ABCD. If the diagonal vec BD = hat i +2 hat j +3 hat k then the area of the Parallelogram is equal to.

Q. Find the value of the maximum area possible (in sq.units) of △ ABC with vertices A(0, 0), B(x, y) and C(-x, y) such that y = - 2x2 + 54x.
Q. What is the range of r for which circles $(x + 1)^2 + (y + 2)^2 = r^2$ and $x^2 + y^2$ - 4x - 4y + 4 = 0 coincide at two distinct points

Q5. Find the value of

$$\lim_{n\to\infty} \sum_{k=1}^{n} \frac{n^3}{(n^2+k^2)(n^2+3k^2)}$$

Q . If the foot of the perpendicular from (1, 2, 3) to the line (x + 1)/2 = (y - 2)/5 = (z - 4)/1 is (α, β, γ), then find α + β+ γ.
Q. In an arithmetic progression, if the sum of 20 terms is 790 and the sum of 10 terms is 145, then S15 - S5 = ?