

JEE Main 30 January 2024 Shift 2 Answer Key

Physics

Q.1: What work is done by the friction force when 1kg of block is placed on the inclined surface. 10 N force is applied to the block in the upward direction and the displacement is 10 meters ($\mu = 0.1$)

A.1: 5J

Q.2: Determine the ratio of their initial velocities when two balls are launched from a height of 400 m at angles of 60° and 45° with the horizontal, respectively, while maintaining equal ranges and times of flight.

A.2: $\sqrt{\frac{2}{3}}$

Q.3: 1000 drops of surface energy E_1 coalesce to form 1 bigger drop of surface energy E_2 . Calculate the value of $E_2/E_1 \times 10^3$

A.3: 100

Q.4: Calculate the V_{escape} when R_p (Radius of Planet) = $1/3 R_E$ and M_p (Mass of the planet) = $1/6 M_E$. (Take the escape velocity of the earth as 11.2 km/hr)

A.4: 8 Km/hr

Q.5: Determine the magnetic field at the center of a square frame with a side length of 1 meter when a current of 5 amperes is flowing through it.

A.5: $\sqrt{2} \times 10^{-6}$

Q.6: A 1000-ohm resistor and a 200-ohm resistor are connected in series with a 4V battery. The voltmeter across the 100-ohm resistor reads 1V. Calculate the internal resistance of the voltmeter.

A.6: 200 Ohms

Q.7: A graph is drawn between the maximum kinetic energy of the electron and the incident frequency of the photon. The slope of this graph represents:

A.7: $y = mx + c$

Q.8: Calculate the time it takes for an electron to complete one full revolution in a circular orbit with a radius 'r' around an infinitely long uniformly charged wire, where the linear charge density is 'lambda'.

A.8: $\frac{2\pi}{w} = 2\pi \sqrt{\frac{mR^2}{2ek\lambda}}$

Q.9: What is the change in kinetic energy of the system? If a disc of the moment of inertia 4 kgm^2 is spinning freely at 10 rad/s . A second disc of the moment of inertia 2 kgm^2 and angular speed 4 rad/s slides down the spindle of the first disc and they spin together.

A.9: 24 J

Q.10: A nucleus of mass M decays into three daughter nuclei of equal mass. Then velocity of each daughter nuclei is:

A.10: 4

Q.11: An electron is revolving in n orbital of He^+ ion. Its magnetic moment depends on the radius of the orbital as:

A.11: m is proportional to n