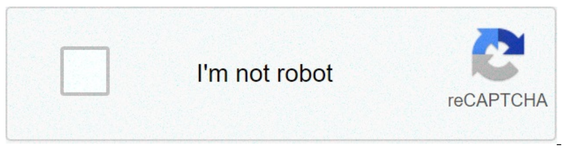

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Notes of physics class 11 chapter 6

2 Marks Questions1.A body is moving along Z – axis of a co – ordinate system is subjected to a constant force F is given by Where are unit vector along the x, y and z – axis of the system respectively what is the work done by this force in moving the body a distance of 4m along the Z – axis? Ans: W = 12 J2.A ball is dropped from the height h1 and if rebounces to a height h2. Find the value of coefficient of restitution?Ans:Velocity of approach (Ball drops form height h1)Velocity of separation (Ball rebounds to height h2)Coefficient of restitution3.State and prove work energy theorem analytically?Ans:It states that work done by force acting on a body is equal to the change produced in its kinetic energy.If force is applied to move an object through a distance dSThen Hence W = Kf – Ki Where Kf and Ki are final and initial kinetic energy.4.An object of mass 0.4kg moving with a velocity of 4m/s collides with another object of mass 0.6kg moving in same direction with a velocity of 2m/s. If the collision is perfectly inelastic, what is the loss of K.E. due to impact?Ans:m1 = 0.4kg, u1 = 4m/s, m2 = 0.6kg u2 = 2m/s.Total K.E. be fore collisionSince collision is perfectly inelasticTotal K.E. after collisionLoss in K.E. =Ki – Kf = 4.4 – 3.92 = 0.48J 5.Why does the density of solid | liquid decreases with rise in temperature? Ans.Let P = Density of solid | liquid at temperature TP1 = Density of solid | liquid at Temperature T+ΔT Since Density = So, P = →(1) P1 = (2)V1 = Volume of solid at temperature T = ΔTV = Volume of solid at temperature TSince on increasing the temperature, solids | liquids expand that is their volumes increases, so by equationi) & 2) Density is inversely proportional to volumes, so if volume increases on increasing the temperature, Density will decrease.6.Two bodies at different temperatures T1, and T2 are brought in thermal contact do not necessarily settle down to the mean temperature of T1 and T2? Ans.Two bodies at diff temperatures T1 and T2 when in thermal contact do not settle always at their mean temperature because the thermal capacities of two bodies may not be always equal.7.The resistance of certain platinum resistance thermometer is found to be 2.56 Ω at 00c and 3.56 Ω at 1000c. When the thermometer is immersed in a given liquid, its resistance is observed to 5.06 Ω. Determine the temperature of liquid?Ans.Ro = Resistance at00c = 2.56ΩRt = Resistance at temperature T = 1000c = 3.56Ω 100Rt = Resistance at unknown temperature t ;Rt = 5.06ΩSince,t = t = 2500c8.A ball is dropped on a floor from a height of 2cm. After the collision, it rises up to a height of 1.5m. Assuming that 40% of mechanical energy lost goes to thermal energy into the ball. Calculate the rise in temperature of the ball in the collision. Specific heat capacity of the ball is 800J/k. Take g = 10m/s2Ans.Initial height = h1=2mFinal height = h2=1.5mSince potential energy = mechanical energy for a body at rest as K.E =0Mechanical energy lost = = = = 5 JNow (mechanical energy lost) × 40% = heat gained by ballΔT = 2.5×10-3 0C9.A thermometer has wrong calibration. It reads the melting point of ice as – 100C. It reads 600C in place of 500C. What is the temperature of boiling point of water on the scale? Ans .Lower fixed point on the wrong scale = -100C.Let 'n' = no. divisions between upper and lower fixed points on this scale. If Q = reading on this scale, then Now, C = Incorrect Reading = 600CQ = Correct Reading = 500CSo, n = 140Now, On, the Celsius scale, Boiling point of water is 1000CSo, Q = 1300C10.Write the advantages and disadvantages of platinum resistance thermometer? Ans.Advantages of Platinum Resistance thermometer:-1) High accuracy of measurement2) Measurements of temperature can be made over a wide range of temperature i.e. from – 2600C to 12000C.→ Disadvantages of Platinum Resistance thermometer:-1) High Cost2) Requires additional equipment such as bridge circuit, Power supply etc.11.If the volume of block of metal changes by 0.12% when it is heated through 200C. What is the co-efficient of linear expansion of the metal? Ans .07.The co-efficient of cubical expansion y of the metal is given by:-Here, ∴ Co-efficient of linear expansion of the metal is :-12.The density of a solid at00C and 5000C is in the ratio 1.027 : 1. Find the co-efficient of linear expansion of the solid? Ans. Density at 00C = SODensity at 5000C = S500Now, SO = S500 Where, Y = Co-efficient of volume expansionΔT = Change in temperatureΔT = Change in temperatureΔT = Final Temperature – Initial temperatureΔT = 500 - 00CΔT = 5000COr Now, Co-efficient of linear expansion (α) is related to co-efficient of volume expansion (Y) as :-13. If one Mole of a monatomic gas is mixed with 3 moles of a diatomic gas. What is the molecular specific heat of the mixture at constant volume? Ans. 09.For, a monatomic gas, Specific heat at consent volume = CV1 = ; R = Universal Gas ConstantNo. of moles of monatomic gas = n1 = 1 moleNo. of moles of diatomic gas = n2 = 3 moles. For, diatomic gas, specific heat at constant volume Applying, conservation of energy.Let CV = Specific heat of the mixture;R = Universal Gas constant14.Calculate the difference between two principal specific heats of 1g of helium gas at N. T. P. Given Molecular weight of Helium = 4 and J = 4.186 J/cal and Universal Gas constant, R = 8.314J / mole / K? Ans. 10.Molecular weight of Helium = M = 4Universal Gas Constant, R = 8.31J | mole | KCP = specific heat at constant PressureCV = specific heat at constant VolumeNow, for 1 mole of gas.Where R = Universal Gas Constant = 8.31J | mole | KJ = 4.186 J | calM = Molecular weight of Helium = 415.Why does heat flow from a body at higher temperature to a body at lower temperature? Ans. 11.When a body at higher temperature is in contact with a body at lower temperature, molecule with more kinetic energy that are in contact with less energetic molecules give up some of their kinetic energy to the less energetic ones.16.A one liter flask contains some mercury. IT is found that at different temperatures, then volume of air inside the flask remains the same. What is the volume of mercury in the flask? Given the co-efficient of linear expansion of glass = 9 × 10-6 / 0C and co-efficient of volume expansion of mercury = 1.8 × 10-4 / 0CAns.It is given that volume of air in the flask remains the same at different temperature. This is possible only when the expansion of glass is exactly equal to the expansion of mercury,Co-efficient of cubical expansion of glass is :-Co-efficient of cubical expansion of mercury is :→Volume of flask, V = 1 liter = 1000 cm3.Let Vm Cm3 be the volume of mercury in the flask.Expansion of flask = Expansion of Mercury.∴ Volume of Mercury, 17. The potential energy function for a particle executing linear simple harmonic motion is given by V(x) = /2, where k is the force constant of the oscillator. For k = 0.5 N, the graph of V(x) versus x is shown in Fig. 6.12. Show that a particle of total energy 1 J moving under this potential must 'turn back' when it reaches x = ± 2 m. Ans: Total energy of the particle, E= 1JForce constant, k= 0.5 N Kinetic energy of the particle, K = According to the conservation law:E= V + KAt the moment of 'turn back', velocity (and hence K) becomes zero.Hence, the particle turns back when it reaches x = m.18. State if each of the following statements is true or false. Give reasons for your Ans.. (a) In an elastic collision of two bodies, the momentum and energy of each body is conserved. (b) Total energy of a system is always conserved, no matter what internal and external forces on the body are present. (c) Work done in the motion of a body over a closed loop is zero for every force in nature. (d) In an inelastic collision, the final kinetic energy is always less than the initial kinetic energy of the system. Ans. (a) False(b) False(c) False(d) TrueExplanation: (a) In an elastic collision, the total energy and momentum of both the bodies, and not of each individual body, is conserved.(b) Although internal forces are balanced, they cause no work to be done on a body. It is the external forces that have the ability to do work. Hence, external forces are able to change the energy of a system.(c) The work done in the motion of a body over a closed loop is zero for a conservation force only.(d) In an inelastic collision, the final kinetic energy is always less than the initial kinetic energy of the system. This is because in such collisions, there is always a loss of energy in the form of heat, sound, etc.19. A body is initially at rest. It undergoes one-dimensional motion with constant acceleration. The power delivered to it at time t is proportional to (i) (ii) t (iii) (iv) Ans. (ii) tMass of the body = mAcceleration of the body = aUsing Newton's second law of motion, the force experienced by the body is given by the equation:F = maBoth m and a are constants. Hence, force F will also be a constant.F = ma = Constant … (i)For velocity v, acceleration is given as,Where, is another constantPower is given by the relation:P = F.vUsing equations (i) and (iii), we have:Hence, power is directly proportional to time.20. A body is moving unidirectionally under the influence of a source of constant power. Its displacement in time t is proportional to (i) (ii) t (iii) (iv) Ans. (iii)Power is given by the relation:P = FvIntegrating both sides:For displacement of the body, we have:Where New constantOn integrating both sides, we get:21. A pump on the ground floor of a building can pump up water to fill a tank of volume 30 in 15 min. If the tank is 40 m above the ground, and the efficiency of the pump is 30%, how much electric power is consumed by the pump? Ans. Volume of the tank, V= Time of operation, t= 15 min = 15 ×60 = 900 sHeight of the tank, h= 40 mEfficiency of the pump, = 30%Density of water, Mass of water, m= Output power can be obtained as:For input power, efficiency is given by the relation:22. A body of mass 0.5 kg travels in a straight line with velocity where. What is the work done by the net force during its displacement from x = 0 to x = 2 m? Ans. Mass of the body, m= 0.5 kgVelocity of the body is governed by the equation, Initial velocity, u (at x = 0) = 0Final velocity v (at x = 2 m) Work done, W = Change in kinetic energy23. A family uses 8 kW of power. (a) Direct solar energy is incident on the horizontal surface at an average rate of 200 W per square meter. If 20% of this energy can be converted to useful electrical energy, how large an area is needed to supply 8 kW? (b) Compare this area to that of the roof of a typical house. Ans. (a) (a) Power used by the family, P = 8 kW = WSolar energy received per square metre = 200 WEfficiency of conversion from solar to electricity energy = 20 %Area required to generate the desired electricity = AAs per the information given in the question, we have:(b) The area of a solar plate required to generate 8 kW of electricity is almost equivalent to the area of the roof of a building having dimensions 14 m × 14 m.24. A bolt of mass 0.3 kg falls from the ceiling of an elevator moving down with an uniform speed of 7. It hits the floor of the elevator (length of the elevator = 3 m) and does not rebound. What is the heat produced by the impact? Would your Ans. be different if the elevator were stationary? Ans. Mass of the bolt, m= 0.3 kgSpeed of the elevator = 7 m/sHeight, h = 3 mSince the relative velocity of the bolt with respect to the lift is zero, at the time of impact, potential energy gets converted into heat energy.Heat produced = Loss of potential energy= mgh = = 8.82 JThe heat produced will remain the same even if the lift is stationary. This is because of the fact that the relative velocity of the bolt with respect to the lift will remain zero.25. Consider the decay of a free neutron at rest: n → p+ e- Show that the two-body decay of this type must necessarily give an electron of fixed energy and, therefore, cannot account for the observed continuous energy distribution in the decay of a neutron or a nucleus (Fig. 6.19). [Note: The simple result of this exercise was one among the several arguments advanced by W. Pauli to predict the existence of a third particle in the decay products of decay. This particle is known as neutrino. We now know that it is a particle of intrinsic spin ½ (like e-, p or n), but is neutral, and either massless or having an extremely small mass (compared to the mass of electron) and which interacts very weakly with matter. The correct decay process of neutron is: n → p + e-+ v]Ans. The decay process of free neutron at rest is given as:From Einstein's mass-energy relation, we have the energy of electron as Where,Δm= Mass defect = Mass of neutron-(Mass of proton + Mass of electron)c = Speed of lightΔm and c are constants. Hence, the given two-body decay is unable to explain the continuous energy distribution in the decay of a neutron or a nucleus. The presence of neutrino von the LHS of the decay correctly explains the continuous energy distribution. CBSE, NCERT, JEE Main, NEET-UG, NDA, Exam Papers, Question Bank, NCERT Solutions, Exemplars, Revision Notes, Free Videos, MCQ Tests & more. 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These are the Work, Energy and Power class 11 Notes prepared by team of expert teachers. The revision notes help you revise the whole chapter in minutes. Revising notes in exam days is on of the the best tips recommended by teachers during exam days.CBSE Class XI PHYSICS Revision Notes CHAPTER 6 WORK, ENERGY AND POWER CLASS 11 NOTESNotions of work, work-energy theorem, powerKinetic energy Potential energy The conservation of Energy Non-conservative forces-Motion in a vertical circle, CollisionsSUMMARY1. The work-energy theorem states that the change in kinetic energy of a body is the workdone by the net force on the body.2. A force is conservative if (i) work done by it on an object is path independent anddepends only on the end points {xi, xj}, or (ii) the work done by the force is zero for anarbitrary closed path taken by the object such that it returns to its initial position.3. For a conservative force in one dimension, we may define a potential energy function V(x)such that 4. The principle of conservation of mechanical energy states that the total mechanicalenergy of a body remains constant if the only forces that act on the body are conservative.5. The gravitational potential energy of a particle of mass m at a height x about the earth's surface is V(x) = m g xwhere the variation of g with height is ignored.6. The elastic potential energy of a spring of force constant k and extension x is 7. The scalar or dot product of two vectors A and B is written as A. B and is a scalar quantity given by : A.B = AB cos , where is the angle between A and B. It can be positive, negative or zero depending upon the value of . The scalar product of two vectors can be interpreted as the product of magnitude of one vector and component of the other vector along the first vector. For unit vectors :Scalar products obey the commutative and the distributive laws.Physical Quality SymbolDimensionsunitsRemarksWorkWJW=F.d.Kinetic EnergyKJPotential energyV(x)JMechanical energyEJE= K+VSpring ConstantKPowerPWP=F.vWork, Energy and Power class 11 NotesCBSE Revision notes (PDF Download) FreeCBSE Revision notes for Class 11 Physics PDFCBSE Revision notes Class 11 Physics – CBSECBSE Revisions notes and Key Points Class 11 PhysicsSummary of the NCERT books all chapters in Physics class 11Short notes for CBSE class 11th PhysicsKey notes and chapter summary of Physics class 11Quick revision notes for CBSE board examsCBSE Class-11 Revision Notes and Key PointsWork, Energy and Power class 11 Notes. CBSE quick revision note for class-11 Physics, Chemistry, Maths, Biology and other subject are very helpful to revise the whole syllabus during exam days. The revision notes covers all important formulas and concepts given in the chapter. 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