Work power energy: Previous year questions 2000-17

2017

1. Name the process used for producing electricity using nuclear energy   [1 mark]

2016

1. A boy weighing 40 kgf climbs up a stair of 30 steps each 20cm high in 4 min and a girl weighing 30kgf does the same work in 3 minutes. compare
   a. The work done by them
   b. The power developed by them   [2 marks]

2015

1. How is the work done by a force measured when the force
   a. Is in the direction of displacement
   b. Is at an angle to the direction of displacement   [2 marks]
2. State the energy changes in the following while in use
   a. Burning of a candle
   b. A steam engine   [2 marks]
3. Rajan exerts a force of 150 N in pulling a cart at a constant speed of 10 m/s. Calculate the power exerted.   [2 marks]
4. Name the physical quantity measured in terms of horse power [1 mark]
5. Explain briefly why the work done by a fielder when he takes a catch in a cricket match is negative. [2 marks]

2014

1. When does a force do work [1 mark]
2. What is the work done by the moon when it revolves around the earth [1 mark]
3. Calculate the change in kinetic energy of a moving body if its velocity is reduced to 1/3 of the initial velocity [2 marks]
4. State the energy changes in the following devices while in use
   a. A loud speaker
   b. A glowing electric bulb
5. The conversion of part of the energy into an undesirable form is called .... [1 mark]
6. A man having box on his head, climbs up a slope and another man having an identical box walks the same distance on a levelled road. Who does more work against the force of gravity and why? [2 marks]
7. A body is thrown vertically upwards. Its velocity keeps on decreasing. What happens to its kinetic energy as its velocity becomes zero [1 mark]

2013

1. State the principle of conservation of energy [1 mark]
2. Name the form of energy which a body may possess even when it is not in motion [1 mark]

3. A force is applied on a body of mass 20 kg moving with a velocity of 40 m/s. The body attains a velocity of 50 m/s in 2 s. calculate the work done by the body [2 marks]
4. A girl of mass 35 kg climbs up from the first floor of a building at a height 4m above the ground to the third floor at a height 12m above the ground. What will be the increase in her gravitational potential energy (g = 10 m/s^2) **[2 marks]**

2012

1. A ball is placed on a compressed spring. When the spring is released, the ball is observed to fly away
   a. What form of energy does the compressed spring possess
   b. Why does the ball fly away   **[2 marks]**
2. (i) State the energy conversion taking place in a solar cell
   (ii) Give one disadvantage of using a solar cell   **[2 marks]**
3. A body of mass 0.2 kg falls from a height of 10 m to a height of 6m above the ground. Find the loss in potential energy taking place in the body. [g=10 ms^{-2}] **[2 marks]**
4. Name the force required for uniform circular motion. State its direction **[1 mark]**
5. A moving body weighing 400N possesses 500J of kinetic energy. Calculate the velocity with which the body is moving [g=10 ms^{-2}] **[2 marks]**

2011

1. A ball of mass 200g falls from a height of 5m. What will be its kinetic energy when it just reaches the ground [g=10 ms^{-2}] **[2 marks]**
2. A coolie carrying a load on his head and moving on a frictionless horizontal platform does no work. Explain the reason why   **[2 marks]**
3. Draw a diagram to show the energy changes in an oscillating simple pendulum. Indicate in your diagram how the total mechanical energy in it remains constant during the oscillation   **[3 marks]**

2010

1. A body is acted upon by a force. State two conditions under which the work done could be zero[2 marks]
2. A body of mass 50 kg has a momentum of 3000 kg-m/s. calculate
   a. The kinetic energy of the body
   b. The velocity of the body   [3 marks]
3. A sprig is kept compressed by a small trolley of mass 0.5 kg lying on a smooth horizontal surface as shown in the figure given below. When the trolley is released, it is found to move at a speed of 2 m/s, what potential energy did the spring possess when compressed [2 marks]

2009

1. A body of mass 5 kg is moving with a velocity of 10 m/s. what will be the ratio of its initial KE and final KE, if the mass of the body is doubled and its velocity is halved   [2 marks]
2. What is the SI unit of energy? How is the electron volt (eV) related to it?   [2 Marks]
3. 6.4 kJ of energy causes a displacement of 64 m in a body in the direction of force in 2.5 s. calculate
   a. The force applied

      b.   Power in horsepower (HP) [1 HP=746 W]   [3 marks]

4. State the energy changes that takes place in the following when they are in use
   a. Photovoltaic cell
   b. An electromagnet   [2 marks]
5. An object of mass 'm' is allowed to fall freely from point 'A' as shown in the figure. Calculate the total mechanical energy of the object at
   a. Point 'A'
   b. Point 'B'
   c. Point 'C'
   d. State the law is verified by your calculations in parts (a), (b), (c)   [4 marks]

2008

1. Define joule. Give the SI unit of work and establish a relationship between the SI and CGS unit of work.   [3 marks]
2. When an arrow is shot from a bow, it has kinetic energy in it. Explain briefly from where does it gets its KE?   [2 marks]
3. What energy conversions take place in the following when they are working
   a. Electric toaster
   b. Microphone   [2 marks]
4. (i) A stone of mass 64 g is thrown vertically upward from the ground with an initial speed of 20 m/s. the gravitational PE at the ground level is considered to be zero. Apply the principle of conversion of energy and calculate the PE at the maximum height attained by the stone (g=10 m/s^2)
   (ii) Using the same principle, state what will be the total energy of the body at its half way point   [4 marks]

2007

1. Two bodies A and B of equal mass are kept at heights 20 m and 30 m respectively. Calculate the ratio of their potential energies.   [2 marks]
2. (i) define 1 KwH and how is it related to the joule?
   (ii) How can the work done be measured when force is applied at an angle to the direction of displacement   [3 marks]
3. What is the main energy transformation that occurs in
   a. Photosynthesis in green house
   b. Charging of a battery   [2 marks]

2006

1. State the amount of work done by an object, when it moves in a circular path for one complete rotation. Give your reason to justify your answer [2 marks]

2005

1. What should the angle between force and displacement be to get the
   a. Minimum work
   b. Maximum work   [2 marks]
2. What is the SI unit of energy? How is the electron volt (eV) related to it?   [2 Marks]
3. The work done by the heart is 1 joule per beat. Calculate the power of the heart, if it beats 72 times in one minute   [2 marks]

4. State the law of conversion of energy   [3 marks]

2004

1. A ball of mass 0.2 kg is thrown vertically upwards with an initial velocity of 20 m/s. calculate the maximum PE it gains as it goes up   [2 marks]

2003

1. If the power of a motor is 40 kW, at what speed does it raises a load of 20000 N? [2 marks]

2002

1. How is work done related to the applied force [1 mark]
2. Define work [1 mark]
3. By what factor does the kinetic energy of a moving body change when its speed is reduced to half?   [1 mark]
4. What do kilowatt hour measure   [1 mark]
5. A machine raises a load of 750 N through a height of 16 m in 5 s. calculate the power at which the machine works.   [2 marks]
6. Define power and energy   [3 marks]
7. (i) State the energy conversion taking place in a solar cell
   (ii) Give one disadvantage of using a solar cell

2001

1. What do kilowatt hour measure   [1 mark]

2000

2. A body of P has a mass of 20 kg and is moving with a velocity of 5 m/s. another body 'Q' has a mass of 5 kg and is moving with a velocity of 20 m/s. Calculate
   a. The ratio of momentum of P and Q
   b. The kinetic energy of P in SI unit   [2 marks]
3. An engine can pump 30000 L of water to a vertical height of 45 m in 10 min. (9.8 m/s²). Calculate the work done by the machine and its power (density of water = 10^{-3} kg/m³, 1000L=1m³)