2017
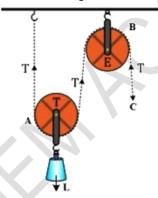
1. Which class of lever will always have MA > 1 and why? [2 marks]
2. A boy uses a single fixed pulley to lift a load of 50 kgf to some height. Another boy uses a single movable pulley to lift the same load to the same height. Compare the effort applied by them. Give a reason to support your answer [1 mark]
3. A pulley system with VR = 4 is used to lift a load of 175 kgf through a vertical height of 15 m. the effort required is 50 kgf in the downward direction ($g=10$ NKg^{-1}). Calculate
   a. Distance moved by the effort
   b. Work done by the effort
   c. M.A. of the pulley system
   d. Efficiency of the pulley system   [4 marks]

2016

1. With reference to the terms M.A, V.R and efficiency of a machine, name and define the term that will not change for a machine of a given design [2 marks]
2. From the diagram given below, answer the questions that follow [3 marks]

   a. What kind of pulleys are A and B?
   b. State the purpose of pulley B
   c. What effort has to be applied at C to just raise the load L=20 kgf

   (Neglect the weight of the pulley A and friction)

2015

1. Draw a simplified diagram of a lemon crusher, indicating direction of load and effort [2 marks]
2. A block and tackle system has V.R=5
   a. Draw a neat labelled diagram of a system indicating the direction of its load and effort
   b. Rohan exerts a pull of 150 kgf. What is the maximum load he can raise with this pulley system, if its efficiency is 75% [4 marks]

2014

1. What is the principle of an ideal machine? [1 mark]
2. Draw a diagram to show how a single pulley can be used so as to have its ideal M.A.=2 [2 marks]
3. Derive a relationship between M.A., V.R. and η of a machine [3 marks]

2013

1. A type of single pulley is very often used as a machine even though it does not give any gain in mechanical advantage
   a. Name the type of pulley used
   b. For what purpose is a such a pulley used [2 marks]
2. A block and tackle system of pulleys has a V.R. = 4 [4 marks]
   a. Draw a labelled diagram of the system indicating clearly the points of application and directions of load and effort
   b. What is the value of the M.A. of the given pulley system, if it is an ideal pulley system

2012

1. State the class of levers and the relative positions of load (L), Effort (E), and fulcrum (F) in each of the following cases [2 marks]
   a. A bottle opener
   b. Sugar tongs

2011

1. What is meant an ideal machine [1 mark]
2. Write a relationship between M.A., and V.R. of an ideal machine [1 mark]
3. The diagram alongside shows a lever in use
   a. To which class of lever does it belong
   b. FA=40 cm, AB=60 cm then find the mechanical advantage of the lever [2 marks]
4. Name a machine which can be used to
   a. Multiply force
   b. Change the direction of force applied [2 marks]
5. A uniform meter scale can be balanced at the 70.0 cm mark when a mass of 0.05 kg is hung from the 94.0 cm mark.
   a. Draw a diagram of the arrangement
   b. Find the mass of the meter scale [4 marks]

2010

1. Why is the M.A. of a lever of the second order always > 1 [1 mark]
2. Name the type of single pulley that has a M.A. > 1 [1 mark]
3. Write a relation expressing the M.A. of a lever [1 mark]
4. Give two reasons as why the efficiency of single movable pulley system is always < 100 % [1 mark]

2009

1. (i) With reference to the terms M.A., V.R. and η of a machine, name the term that will not change for a machine of a given design
   (ii) Define the term stated by you in part (i) [2 marks]
2. A pulley system comprises two pulleys, one fixed and the other movable. [3 marks]
   a. Draw a labelled diagram of the arrangement and show clearly the directions of all the forces acting on it

   b. What change can be made in the movable pulley of the system to increase the M.A. of the system

2008

1. Copy the diagram of the forearm given below, indicate the positions of load, effort and fulcrum [2 marks]

2. (i) Draw a labelled diagram of a block and tackle system of pulleys with two pulleys in each block. Indicate the directions of the load, effort and tension in the string
   (ii) Write down the relation between the load and the effort of the pulley system [4 marks]

2007

1. Write an expression to show the relationship between M.A, V.R and for a η for a simple machine [2 marks]
2. Which class of lever has a M.A. always > 1? What change can be brought about in this lever to increase its mechanical advantage [2 marks]
3. A block and tackle pulley system has a V.R. =3 [4 marks]
   a. Draw a labelled diagram of this system
   b. In your diagram indicate clearly the points of application and the directions of the load and effort

2006

1. A pulley system has a V.R. of 4 and efficiency of 90%. Calculate
   a. M.A. of the system
   b. The effort required to rise a load of 300 N by the system [3 marks]
2. Name the type of a single pulley that can act as a force multiplier. Draw a labelled diagram of the above named pulley [3 marks]

2005

1. Draw a labelled sketch of a class II lever. Give an example of such a lever [2 marks]
2. The alongside figure shows the combination of a movable pulley P1 with a fixed pulley P2 used for lifting up a load 'W'
   a. State the function of the fixed pulley P2
   b. If the free end of the string moves a through a distance 'x' , find the distance by which the load 'w' is raised
   c. Calculate the force to be applied at 'c' to just raise the load w =20kgf, neglecting the weight of the pulley P1 and friction [4 marks]

2004

1. A woman draws water from a well using a fixed pulley. The mass of the bucket and water together is 6.0 kg. the force applied by the woman is 70 N. calculate the mechanical advantage (take g = 10 m/s2) [2 marks]

2003

1. Give two reasons why the efficiency of a single movable pulley system is not 100% [2 marks]

2002

1. What is the relationship between M.A., V.R. for
   a. Ideal machine
   b. Practical machine [2 marks]
2. A cook uses a fire tong of length 28 cm to lift a piece of burning coal of mass 250 g. if he applies his effort at a distance of 7 cm from the fulcrum, what is the effort in SI unit (take g=10 m/s2) [3 marks]

2001

1. To use a machine as a force multiplier, what types of lever should preferably be used? Draw a sketch of such a lever [2 marks]
2. A pair of scissors and a pair of pliers belong to the same class of levers
   a. Which one has M.A. < 1
   b. State the usefulness of such a machine whose M.A. is < 1 [3 marks]

2000

1. Why is the mechanical advantage of a lever of third order is always less than 1?. Give an example of this class of lever