

# MACHINES

## INCLUDED IN THIS SECTION

- ✓ Multiple-Choice Questions (MCQs)
- ✓ Solutions

- 1. When a machine is used as a force multiplier, then**
  - a) Effort > load
  - b) Effort < load
  - c) Effort = load
  - d) None of these
  
- 2. When a machine is used as a speed multiplier, then**
  - a) Effort > load
  - b) Effort < load
  - c) Effort = load
  - d) None of these
  
- 3. Mechanical advantage of a machine is given by**
  - a) Effort + Load
  - b) Load / Effort
  - c) Effort × load
  - d) None of these
  
- 4. For an ideal machine**
  - a) Output energy = Input energy
  - b) Output energy > Input energy
  - c) Output energy < Input energy
  - d) None of these
  
- 5. The correct relationship between mechanical advantage (M.A), the velocity ratio (V.R) and the efficiency ( $\eta$ ) is**
  - a)  $M.A. = \eta \times v.r.$
  - b)  $V.R. = \eta \times M.A.$
  - c)  $\eta = M.A. \times V.R.$
  - d) None of these
  
- 6. A lever for which the Mechanical Advantage (MA) is less than 1 has the**
  - a) Fulcrum at midpoint between the load and effort
  - b) Load between the effort and fulcrum

- c) Effort between the fulcrum and load
- d) Load and effort acting at the same point

**7. In class-II levers**

- a)  $M.A = V.R$
- b)  $M.A > V.R$
- c)  $M.A > 1$
- d)  $M.A < 1$

**8. Pulley is a \_\_\_\_\_ machine.**

- a) Simple
- b) Complex
- c) Rotational
- d) None of these

**9. A nut that can be broken by applying a force of 40 Kgf is broken by placing a 20 cm long nut cracker at a distance of 2 cm from the hinge. Calculate the minimum force needed to break the nut?**

- a) 8 Kgf
- b) 5 Kgf
- c) 6 Kgf
- d) 4 Kgf

**10. A movable pulley is used as:**

- a) A speed multiplier
- b) A force multiplier
- c) An energy multiplier
- d) None of these

**11. A single fixed pulley is used because**

- a) its mechanical advantage  $> 1$
- b) its velocity ratio  $< 1$
- c) it gives 100% efficiency
- d) it helps to apply the effort in a convenient direction

**12. The mechanical advantage of an ideal pulley is:**

- a) 1
- b) 2
- c) Less than 2
- d) Less than 1

**13. The velocity ratio of a combination of  $n$  moveable pulleys with a fixed pulley is always  $2n$ . Choose the appropriate option.**

- a) True
- b) False
- c) Maybe
- d) Not sure

**14. A woman draws water from a well using a fixed pulley. The mass of the bucket and water together is 6 kg. The Force applied by the woman is 670 N. The Mechanical Advantage will be**

- a) 1.85
- b) 1.16







- c) The ideal mechanical advantage is less than the number of rope segments.
- d) There is no relation between mechanical advantage and number of rope segments.

**36. The velocity ratio of a single movable pulley is**

- a) 2
- b) < 2
- c) > 2
- d) 1

**37. In a ceiling fan**

- a) Electrical energy changes to mechanical energy.
- b) Electrical energy changes to chemical energy.
- c) Electrical energy changes to heat energy.
- d) Chemical energy changes to light energy.

**38. Velocity ratio of a single movable pulley is**

- a) 1
- b) 2
- c) 3
- d) 4

**39. In a single movable pulley, if the effort moves by a distance  $x$  upwards, by what height is the load raised?**

- a) The load is raised to a height of  $x/2$
- b) The load is raised to a height of  $x/3$
- c) The load is raised to a height of  $2x$
- d) The load is raised to a height of  $2/x$

**40. A pulley system has a velocity ratio of 4 and efficiency 90%. Choose a correction option to indicate**

- i. The mechanical advantage of the system
- ii. The effort required to raise a load of 300 N by this system

- a) M.A.=3.6 E=83.33
- b) M.A.=3.6 E=82.33
- c) M.A.=3.4 E=83.33
- d) M.A.=3.4 E=82.33

**41. Name a machine which is used to multiply speed**

- a) movable pulley
- b) gear system or class III lever
- c) single fixed pulley
- d) all of the above

**42. Name a machine which is used to change the direction for force applied**

- a) movable pulley
- b) gear system or class III lever
- c) single fixed pulley
- d) all of the above

