BHARATI VIDYAPEETH INSTITUTE OF TECHNOLOGY

Question Bank (K-Scheme)

Name of subject: Engineering Mechanics **Unit Test: I**

Subject code: 312312 **Course: ME/CE**

Semester-II

CHAPTER 1 (Simple Lifting Machines)

Questions for 2 marks

1. **Define mechanical advantage and velocity ratio with formula.**
2. **State any two uses of machines.**
3. **Write the four characteristics of Ideal machine.**
4. **Define effort lost in friction with formula.**
5. **State the law of machine and it's significance.**
6. **Define self-locking machine with condition.**

Questions for 4 marks

1. **In a simple lifting machine a load of 1400 N is lifted by 50 N effort. While load moves up by 0.2 m, the effort moves by 6m. Find MA, VR and efficiency.**
2. **A machine requires an effort of 5N to lift a load of 60N. The velocity ratio of the machine is 20. Find the load lost due to friction and efficiency of the machine at this load.**
3. **In a single purchase crab, the number of teeth on pinion and main gear are 25 and 100 respectively. The length of effort handle is 0.5 m and the diameter of load drum is 0.25 m. A load of 2500 N is lifted by applying an effort of 200 N. Find the efficiency of the machine.**
4. **In a machine, load of 500 N was lifted by an effort of 50 N and another load of 750 N was lifted by an effort of 60 N. obtain the law of machine. If VR is 40, find the maximum efficiency.**
5. **A trolley of weight 15 N is pulled up from the bottom to the top of an inclined plane by a force of 3 N. if the height h= 3m and length L= 24 m, find MA, VR and efficiency.**

6. **In a differential axle and wheel, the diameter of the wheel is 40 cm and that of axles are 10 cm and 8 cm. If an effort of 50 N can lift a load of 1500 N, find the efficiency of the machine.**
7. **A single purchase crab has the following details:**

   i) No. of teeth on Spur = 125 ii) No. of teeth on pinion = 25

   iii) Diameter of effort wheel = 40 cm iv) Diameter of load drum= 16 cm

   A load of 250N is lifted by an effort of 32 N. Find efficiency of the machine.

8. **A screw jack lifts a load of 41.25 KN with an effort of 550 N, applied at the end of handle of 60cm. If the pitch of screw is 15 mm, calculate velocity ratio, MA, and efficiency of the machine.**

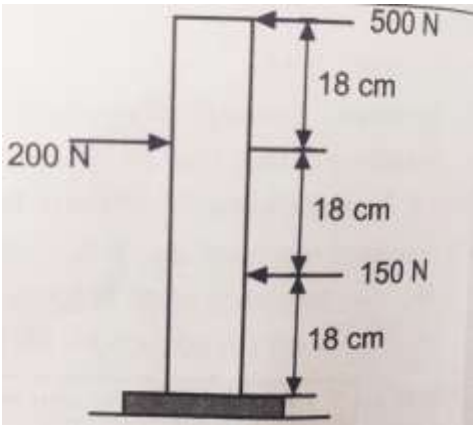
CHAPTER 2 (Analysis of Forces)

Questions for 2 marks

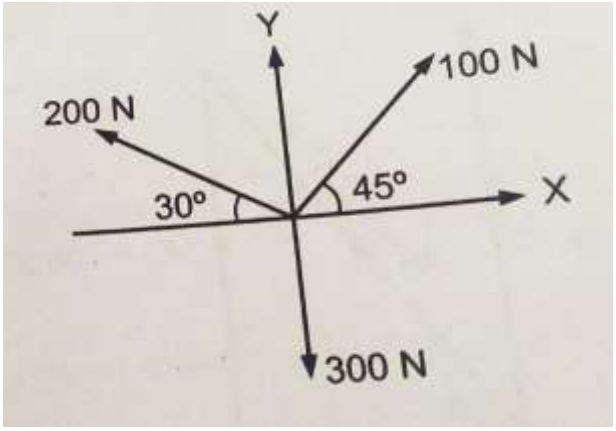
1. **Define Force. State It's SI unit.**
2. **Define Moment. State it's SI unit.**
3. **Write the Characteristics of force.**
4. **State effects of force on a body.**
5. **Define Couple and state it's SI unit.**
6. **Define Resultant Force.**
7. **State Varignon's theorem of moments.**
8. **State the law of parallelogram of forces.**

Questions for 4 marks

1. **Give classification of force system with neat sketch.**
2. **Calculate the total moment about point 'A' for the force system shown in fig.**



3. **Two forces acting at and away from the point have magnitudes of 25 KN and 50 KN respectively having an included angle of 55^0. Find their resultant in magnitude and direction.**
4. **Resolve a force of 100 N into two directions 40^0 and 50^0 on either side of it acting on positive side of X-axis.**
5. **Calculate the resultant of a force system as shown in fig.by analytical method**



6. **Solve above question by graphical method.**
7. **Five parallel forces of 10,20,30,50 and 80 KN are acting on a beam. Distances of forces from 10 KN force are 1m, 2m, 3m, and 5m. Forces 20 KN and 50KN are acting downwards and other pointing upwards. Find resultant and locate it's position with respect to 10KN force.**
8. **Solve above question by graphical method.**

CHAPTER 3 (Equilibrium of Forces)

Questions for 2 marks

1. **Define equilibrium**
2. **State analytical conditions of equilibrium of coplanar concurrent system.**
3. **Define Equilibrant force**
4. **Differentiate between equilibrant and resultant force.**