

## Unit Test I

Question Bank (Total 25 Marks)

Subject – Engineering Mechanics (EGM)

Sub. Code (17204)

Question for 3 Marks.

**Q. No. 1 Attempt any Three (3 x 3 = 9)**

Chapter 1

- 1) Define Mechanical Advantage, Velocity Ratio, and Efficiency of the Machine?
- 2) Differentiate between ideal machine and actual machine.
- 3) State the formula for efforts lost in friction.
- 4) State the formula for load lost in friction.
- 5) What do you mean by Self-locking machine?

Chapter 2

- 1) State the principle of transmissibility of a force
- 2) State the use of Varignon's Theorem of Moments.
- 3) Define the force and its unit.
- 4) What are the different types of coplanar forces?
- 5) Find the components of force of 50 N acting from (2, 2) towards (2, -4).

**Chapter 3**

- 1) What are the limitations of Law of Parallelogram of forces?
- 2) Define Resultant Force.
- 3) What is resolution and composition of force?

**Que. No. 2 Questions for 4 marks.**

Attempt any Two (4 x 2 = 8)

**Chapter 1**

- 1) A screw jack lifts a load of 30 KN with an effort of 400 N at the end of the handle of 60 cm. If the pitch of the screw is 15 mm. Calculate the velocity ratio, M. A. and efficiency of the machine.
- 2) In a worm and worm-wheel, number of teeth on worm wheel is 80. If effort wheel and load drum having diameters 100 mm and 200mm respectively. Find velocity ratio of worm and worm-wheel.

**Chapter 2**

- 1) A loaded wagon is at rest on railway track. It is pulled by force of 1.5 KN applied at an angle of  $45^\circ$  to the railway line. Find the force tending to move the wagon forward.
- 2) Resolve a force of 300 N acting N-W into two components such that one acts along N-E and other acts along  $30^\circ$  S-W.
- 3) A man pulls a hand roller on a cricket pitch and in doing so exerts pull of 150 N inclined at an angle of  $30^\circ$  to the horizontal. Find the force tending to move the roller forward.

### Que. No. 3 Questions For 4 marks.

Attempt any Two (4 x 2 = 8)

#### Chapter 3

- 1) Four forces 10 N, 20 N, 30 N, 40 N acting in upward direction, horizontal distance between 10 N and 20 N is 2m, 10N and 30 N is 4m and 10 N and 40 N is 6m. Calculate resultant and its location by graphical method.
- 2) Three parallel forces of magnitude 100 N, 200 N and 400N are acting vertically upwards at A, B, and C such that AB= 2 m, and BC= 3m Determine the resultant force graphically.

#### Chapter 2

- 1) Find the magnitude of forces P and Q such that if they acts at right angles their resultant is  $\sqrt{34}$  N. If they acts at an angle of  $60^\circ$ , their resultant is 7N.

#### Chapter 1

- 3) A machine has a V.R. of 250 and has its Law,  $P= 0.01W+5$  express in Newtons. Find i) M.A.  
ii) Efficiency iii) Effort lost in friction at load of 1000 N. State whether the machine is reversible or not.

## Question Bank Engg. Mechanics EGM (17204)

### Chapter-4

Q-1 What is the relation between resultant and equilibrant? (3 Marks)

Q-2 Write the analytical conditions of equilibrium for coplanar concurrent force system. (3 Marks)

Q-3 Define the free body and free body diagram. (3 Marks)

Q-4 What is lami's theorem? State it's limitations. (3 Marks)

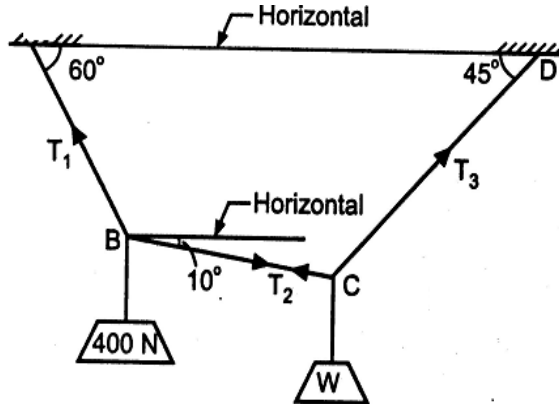
Q-5 A sphere of weight 400N rests in a groove of smooth inclined surfaces which are making  $60^\circ$  and  $30^\circ$  inclination to horizontal. Find the reactions at contact surfaces analytically. (4 Marks)

Q-6 A beam ABC is hinged at A and roller supported at B. Span AB is 5m and overhang BC is 2m. Beam carries UDL of 20 KN/m over a span BC along with point load of 50 KN at 2.5m from support A. Calculate support reactions graphically. (4 Marks)

Q-7 A truck weighing 150KN while crossing a bridge AB, 20m span assumed simply supported stopped due to breakdown at a distance of 4m from B. Find the upward force that should be exerted by end supports if the self weight of bridge is 5KN/m. **(4 Marks)**

Q-8 A weight of 100 N is suspended by a knot from two strings, attached to a horizontal beam. These strings make angles of  $45^\circ$  and  $30^\circ$  with horizontal. Find the tensions in strings graphically. **(4 Marks)**

Q-9 ) A string ABCD is fixed at A & D. Two weights 400 N & 'W' N are attached at B & C. The strings AB, BC & CD are making angles of  $60^\circ$ ,  $10^\circ$  &  $45^\circ$  with horizontal respectively. Find the weight W & tensions



in the strings.

## Chapter-5

Q-1 Define the terms i) Angle of friction ii) Angle of repose iii) Coefficient of friction. **(3 Marks)**

Q-2 State the advantages of Friction. **(3 Marks)**

Q-3 Why lubricating oil is used in machines. **(3 Marks)**

Q-4 Why static friction is greater than dynamic friction. **(3 Marks)**

Q-5 A force of 20N is required to pull a body of 50N resting on horizontal plane. What will be the coefficient of friction. **(3 Marks)**

Q-6 A body of weight 300N is placed on plane inclined at an angle of  $17^\circ$  with horizontal. If the coefficient of friction is 0.3, Find the value of the force to be applied parallel to the plane just to move the body up the plane. **(4 Marks)**

Q-7 A body weighing 1500N is resting on a rough horizontal plane. A pull of 300N applied at  $30^\circ$  with horizontal just moves the body. Find the coefficient of friction. **(4 Marks)**

Q-8 a body resting on a horizontal plane required a pull of 80N inclined at  $30^\circ$  to horizontal just to move it. It was also found that a push of 100N inclined at  $30^\circ$  to the horizontal just moved the body. Find the weight of body and coefficient of friction. **(4 Marks)**

Q-9 A body of 400N weight rests in a limiting equilibrium on  $30^\circ$  rough inclined plane. If the angle of the plane is raised to  $45^\circ$  Find the force along the plane required to keep the body in equilibrium. **(4 Marks)**

Q-10 Write the laws of static Friction. **(4 Marks)**

## **Chapter-6**

Q-1 Define the terms centroid and centre of Gravity. **(3 Marks)**

Q-2 Show in sketch the C.G. of a hemisphere of diameter 200mm. **(3 Marks)**

Q-3 Calculate the centroid of semicircle of radius 100mm. **(3 Marks)**

Q-4 Locate the centroid of angle section having flange 100 X 10mm and web 10 X 80mm. **(4 Marks)**

Q-5 A retaining wall of height 5.2m has one side vertical. The top width is 1.2m and bottom width is 3.6m. find centroid. **(4 Marks)**

Q-6 Find the centroid of channel section 30cm x 12cm x 2cm from back of web. **(4 Marks)**

Q-7 A hemisphere of diameter 100mm is placed on top of a cylinder whose diameter is also 100mm. Find C.G. of composite solid from the base of cylinder if its height is 120mm. **(4 Marks)**

Q-8 A solid cone of 500mm height and 200mm base diameter. If portion above half of its height is removed, determine the point at which the remaining body can be balanced. **(4 Marks)**

Q-9 A solid cone of base diameter 120mm and height 320mm is placed on a horizontal plane with its apex at the top. Find the maximum angle of tilt from which it can come back to the original position. **(4 Marks)**