

## 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 200 mm 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)

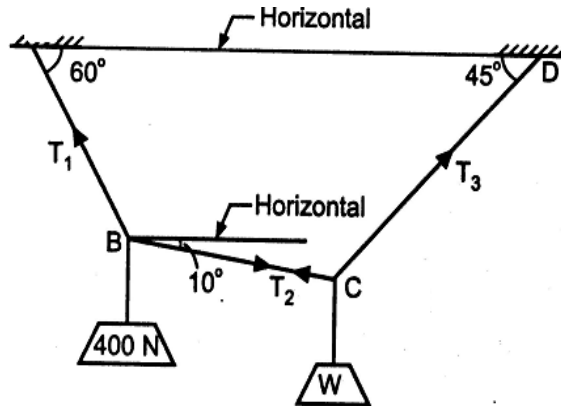
Q-5 A sphere of weight 400N rests in a groove of smooth inclined surfaces which are making  $60^\circ$  and  $30^\circ$  inclination to horizontal. Find the reactions at contact surfaces analytically. (4 Marks)

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 50KN 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°, 100° & 45° 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. **(4Marks)**