

Veer Surendra Sai University of Technology.
Department of Mechanical Engineering.
Mid Term Examination, March 2016.
2nd Semester B.Tech (Section: H, I, J, K, L, M, N).
Sub – ENGINEERING MECHANICS.

Maximum Marks: 20

Time: 2 hours

NOTE: Answer Q.NO 1. and any three from the rest of the given questions.

	Marks.
Q1.	(5 x 1)
(a) Define Engineering Mechanics and explain a rigid body.	(1)
(b) Explain the difference between Kinetics & Kinematics?	(1)
(c) State the principle of Transmissibility and how Resultant & Equilibrant can differentiate?	(1)
(d) State Lami's Theorem and explain with neat sketch?	(1)
(e) Define Free Body Diagram (FBD) and draw FBD of Hinged, Fixed & Roller support.	(1)
Q2.	(2.5x2)
(a) A ball of weight $Q = 53.4 \text{ N}$ rest in a right-angle trough, as shown in figure. A. Determine reactions at D & E if all surface are perfectly smooth.	(2.5)
(b) Two roller of weights " P " = 222.5N and " Q " = 445N are connected by a rigid bar at its ends & supported inside a circular ring in a vertical plane as shown in figure. B. The length of the bar " AB " is such that radii " AC " and " BC " form right-angle at center of the circular ring " C ". Neglecting friction and weight of the bar, find the compressive force in the bar " AB ".	(2.5)
Q3.	(2.5x2)
(a) In figure. C. weights " P " & " Q " are suspended in a vertical plane by string 1, 2, 3 arranged as shown. Find tension in each string if $P = 2225\text{N}$ and $Q = 4450\text{N}$.	(2.5)
(b) A 667.5N man stand on the middle rung of a 222.5N ladder, as shown in figure. D. Assuming the end " B " rest on the corner of the wall and stop at " A " to prevent slipping, find the reaction at " A " & " B ".	(2.5)
Q4.	(2.5x2)
(a) Referring to figure. E, the coefficient of friction are as follows: 0.25 at the floor, 0.3 at the wall & 0.2 between the blocks. Find the minimum value of horizontal force " P " applied to the lower block that will hold the system in equilibrium.	(2.5)
(b) Find the magnitude of the pull " P ", exerted on the nail " C " in figure F. if horizontal force of 178N is applied to the handle of wrecking bar as shown.	(2.5)
Q5.	(2.5x2)
(a) A pulley A is supported by two bars AB and AC which are hinged at points B and C to a vertical mast EF. Over the pulley hangs a flexible cable DG which is fastened to the mast at D and carries at the other end G a Load $Q = 2 \text{ tons}$.	(2.5)

Neglecting friction in the pulley, determine the force produced in the bar AB and AC. (Figure G)

- (b) Two gears having pitch diameters $d_1 = 6\text{cm}$ and $d_2 = 8\text{cm}$, are connected by an idling gear. If a moment M_1 is applied to the upper gear, what is the moment M_2 that must be applied to the lower gear to maintain equilibrium. (Figure H.) (2.5)
- Q6. Two bars of equal length (L) and Weight (W) are maintained in the position shown in the Figure H. by a moment M_0 applied to rod CD. Coefficient of static friction between the rods is 0.40, determine the range of values of M_0 for which equilibrium is maintained. (Figure I). (5)

Figure A.

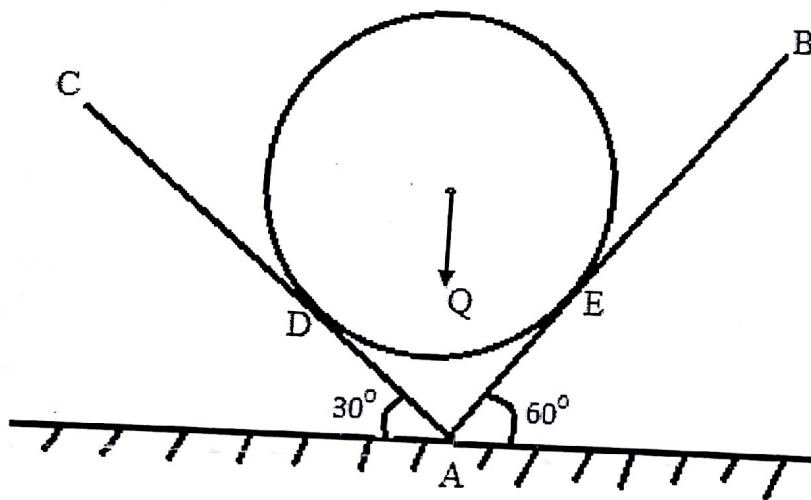


Figure B.

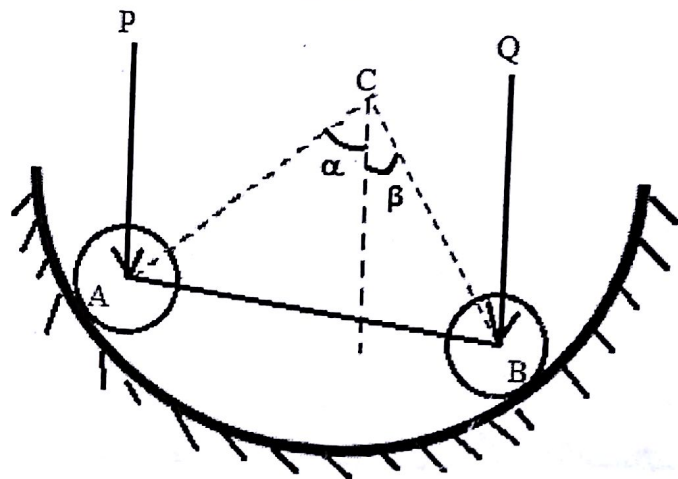


Figure C.

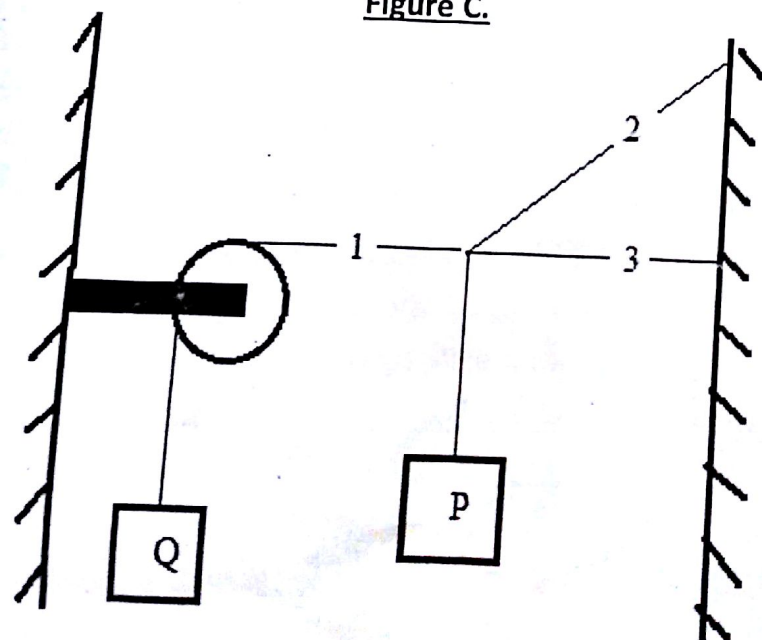


Figure D.

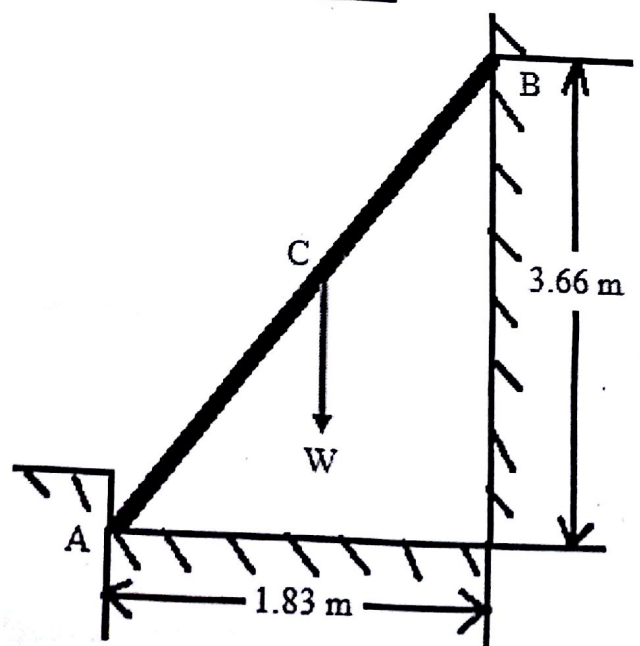


Figure E.

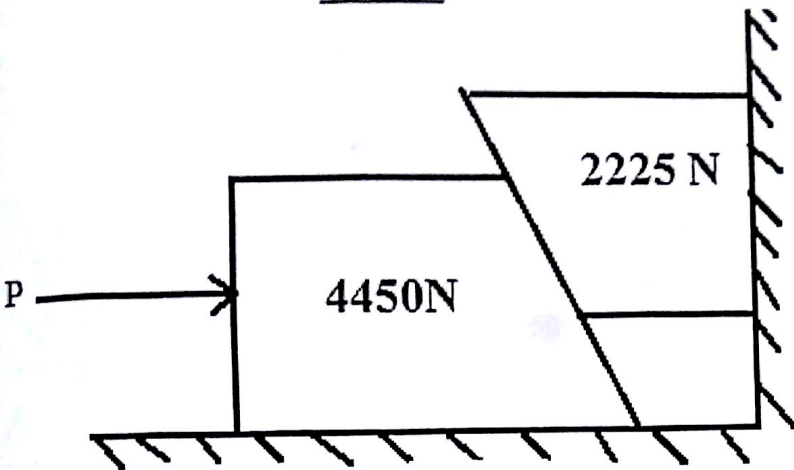


Figure F.

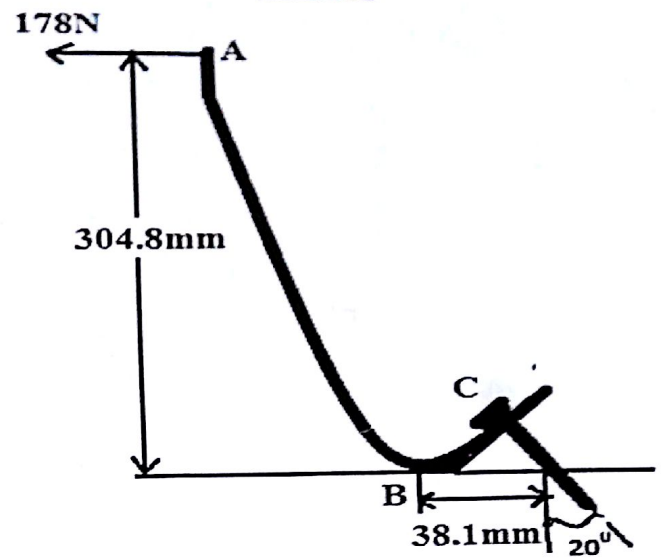


Figure G.

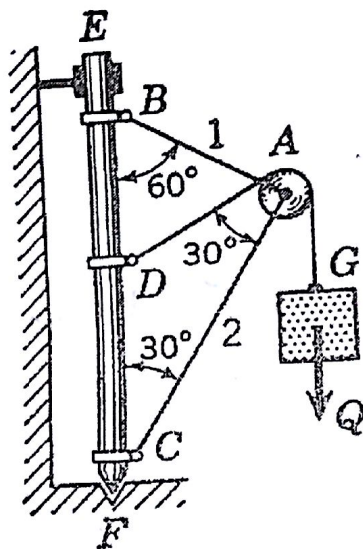


Figure H.

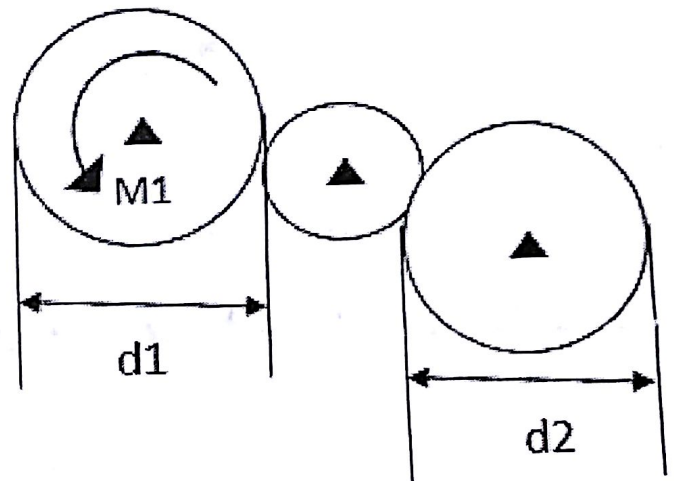


Figure I.

