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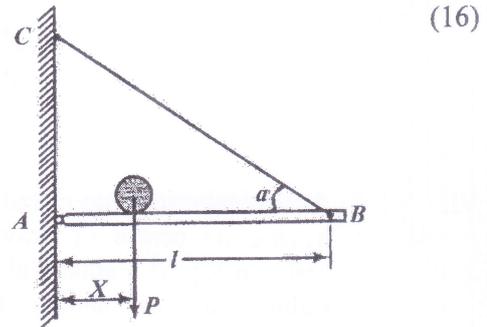
B.Tech. Degree I & II Semester Supplementary Examination in Marine Engineering May 2018

MRE 105 ENGINEERING MECHANICS
(Prior to 2013 Scheme)

Time: 3 Hours

Maximum Marks: 100

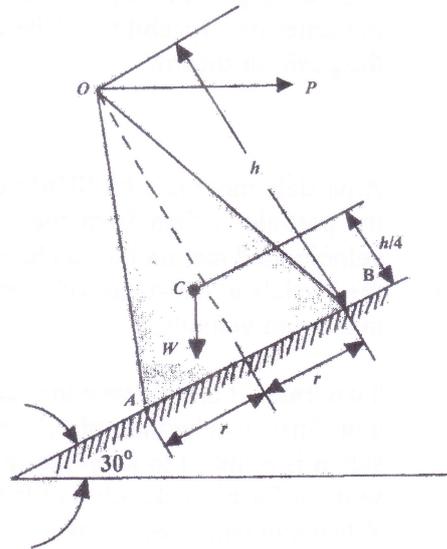
- I. A horizontal prismatic bar AB , of negligible weight and length ' l ' is hinged to a vertical wall at ' A ' and supported at ' B ' by a tie rod BC that makes the angle α with the horizontal as shown in figure. A weight ' P ' can have any position along the bar as defined by the distance ' x ' from the wall. Determine the tensile force in the tie rod.



(16)

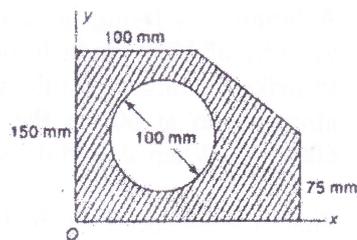
OR

- II. A solid right circular cone of altitude ' h ' = 304.8 mm and radius of base ' r ' = 76.2 mm has its centre of gravity ' C ' on its geometric axis at the distance $h/4$ = 76.2 mm above the base. This cone rests on an inclined plane AB , which makes an angle 30° with the horizontal and for which the coefficient of friction is $\mu = 0.5$. A horizontal force ' P ' is applied to the vertex ' O ' of the cone and acts in the vertical plane of the figure as shown. Determine the maximum and minimum values of ' P ' consistent with equilibrium of the cone if the weight $W = 44.5$ N.



(16)

- III. Referring to figure, determine the coordinates of the centre of a 100 mm diameter, circular hole cut in a thin plate so that this point will be the centroid of the remaining shaded area.



(17)

OR

(P.T.O.)

- XI. The angular acceleration of a flywheel is given by $\alpha = 12 - t$, where α is in rad/s^2 and ' t ' is in seconds. If the angular velocity of the flywheel is 60 rad/s at the end of 4 seconds, determine the angular velocity at the end of 6 seconds. How many revolutions take place in these 6 seconds? (17)

OR

- XII. A homogenous square plate with a centered circular hole is supported as a compound pendulum as shown in figure. Calculate the time period for small oscillations in the vertical plane of the plate. (17)

