Name E:No

**Dept. of Mechanical Engineering**
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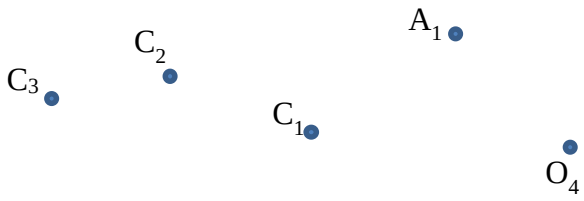
MEL837 Minor 1 29/08/2019

Q1. Consider three positions of a curve to be traced to be given as $C_1$, $C_2$ and $C_3$. For this problem, $A_1$ and $O_4$ are also specified. The task is to find a 4R mechanism such that the crank rotates by $30^o$ and $33^o$ when going from $C_1$ to $C_2$ and $C_2$ to $C_3$. Do it as follows:

a) Find a 4R mechanism such that the coupler rotates through by $30^o$ and $33^o$ when going from $C_1$ to $C_2$ and $C_2$ to $C_3$.
b) Find a cognate of the mechanism above so that the point traced is still C, while the crank now satisfies the rotation requirement of the problem. [4 + 6]



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Q2. Consider the punching bag used in a home setup shown which is a rage as a fitness product. Since the bag is positioned about 1.5m from the wall to allow for movement all around it, the space between the bag and the wall is not of much use. There is currently a system that uses an cantilever beam with a roller to move the bag in and out of the wall.

It is proposed to use a mechanism to move the bag towards the wall to stow and out to use. Since the bag weighs about 100 kg, it is preferable that the path of point of suspension of the bag be a nearly straight horizontal line to avoid too much effort to move in and out. The two pivots have to be on the wall.

i) To achive this, pick a suitable curve from the atlas of curves with a section that is reasonably straight so that the pivots can be placed on the wall. It is preferred that the curve be slightly concave down so that there can be two end stops on the pivots where the bag too stops.

ii) Design a mechanism to guide the bag and indicate where .

iii) Indicate where should the end stops be located so that the bag movement is limited between 0.3 m and 1.5 m.

iv) If the path has cusps at the end, the bag has to move up when loaded under gravity. So the casps become equilibrium points. Eleminate the end stops by designing the path with cusps at the extreme excursion points so that the stopper can be eliminated. Remember that the pivots have to be on/close to the wall.