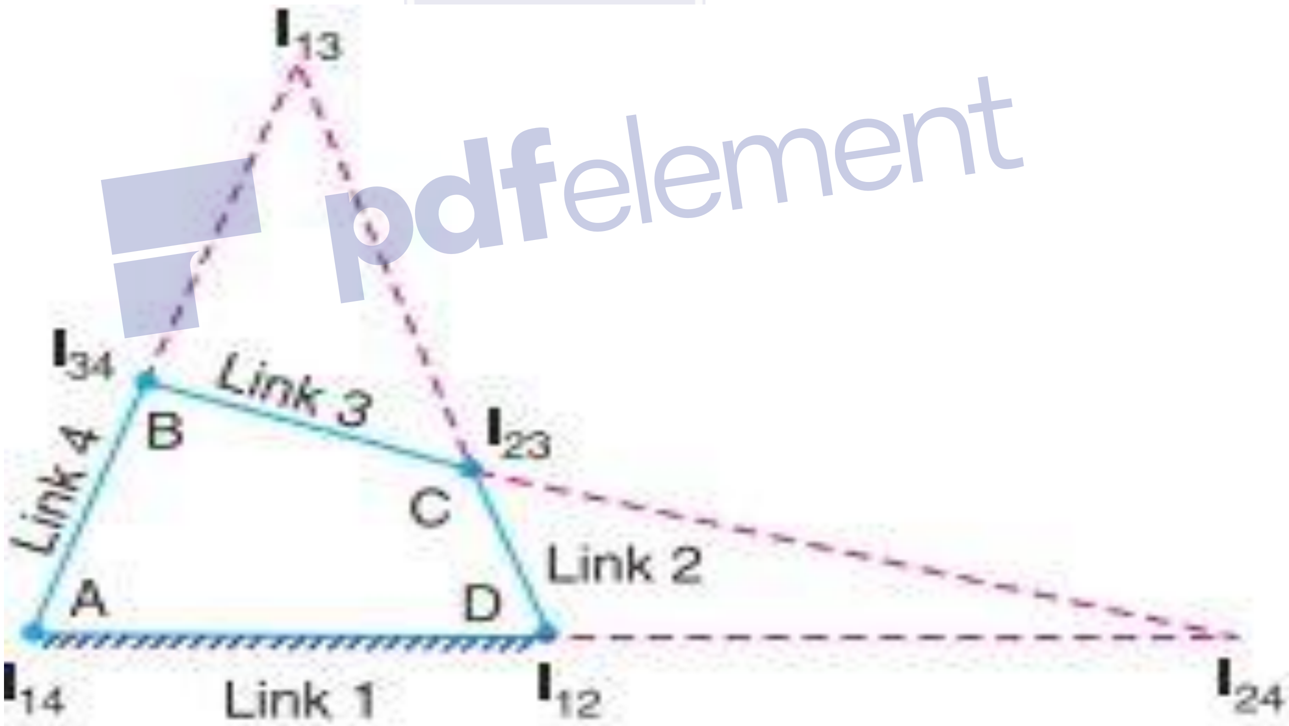
The instantaneous centres I12 and I14 are called the fixed instantaneous centres as they remain in the same place for all configurations of the mechanism. The instantaneous centres I23 and I34 are the permanent instantaneous centres as they move when the mechanism moves, but the joints are of permanent nature. The instantaneous centres I13 and I24 are neither fixed nor permanent instantaneous centres



RAMA UNIVERSITY

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FACULTY OF ENGINEERING & TECHNOLOGY

Introduction

We have already discussed, that when the two elements of a pair have a surface contact and a relative motion takes place, the surface of one element slides over the surface of the other, the pair formed is known as lower pair.

Pantograph

A pantograph is an instrument used to reproduce to an enlarged or a reduced scale and as exactly as possible the path described by a given point. It consists of a

jointed parallelogram ABCDas shown in Fig. It is made up of bars connected by turning pairs. The bars BA and BCare extended to Oand Erespectively, such that

OA/OB= AD/BE

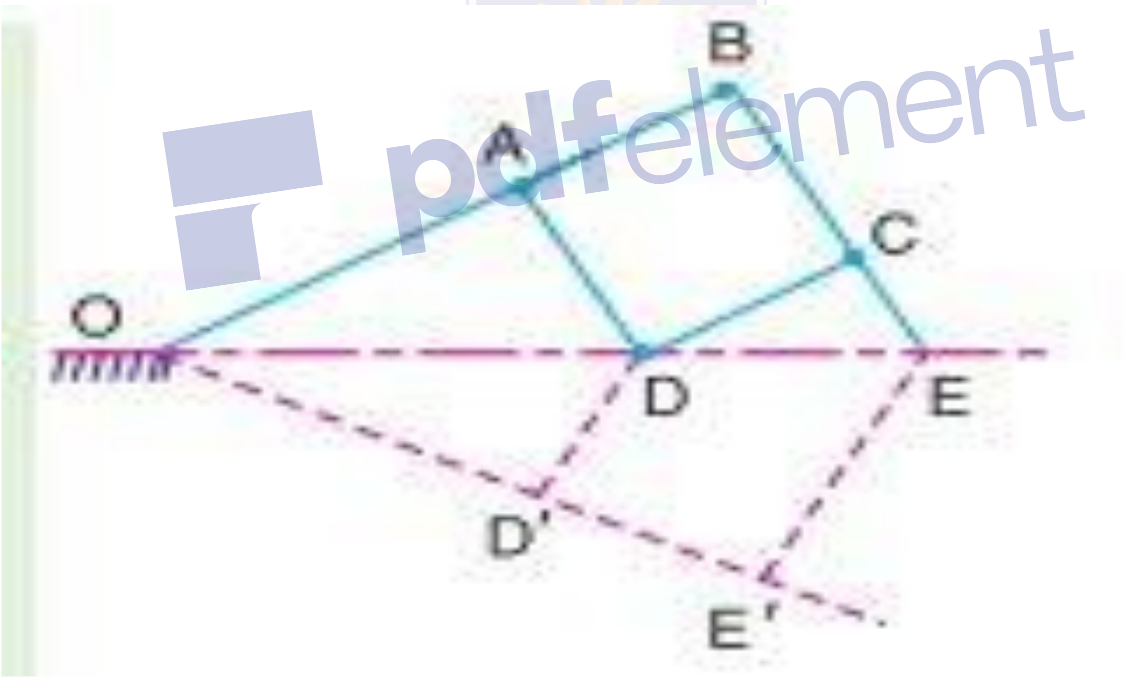
Thus, for all relative positions of the bars, the triangles OADand OBEare similar and the points O, Dand Eare in one straight line. It may be proved that point Etraces out the same path as described by point D.

From similar triangles OAD and OBE, we find that

OD/OE= AD/BE

Let point Obe fixed and the points Dand E move to some new positions D′and E′. Then

OD/OE= OD′/OE′



Straight Line Mechanisms

One of the most common forms of the constraint mechanisms is that it permits only relative motion of an oscillatory nature along a straight line. The mechanisms used for this purpose are called straight line mechanisms. These mechanisms are of the following two types:

1.in which only turning pairs are used, and

2.in which one sliding pair is used

Exact Straight Line Motion Mechanisms Made up of Turning Pairs

The principle adopted for a mathematically correct or exact straight line motion is described in Fig.. Let O be a point on the circumference of a circle of diameter OP.

Let OAbe any chord and Bis a point on OAproduced, such that

OA× OB= constant

Then the locus of a point Bwill be a straight line perpendicular to the diameter OP. This may be proved as follows:

Draw BQperpendicular to OPproduced. Join AP. The triangles OAPand OBQare similar.