TOPIC: 9-**Circuits and Isomorphism**

Isomorphism

If two graphs have exactly the same form in the sense that there is a one-one correspondence between their vertex sets that preserves edges. In such a case, we say that the two graphs are isomorphic. Two graphs $G_1 = (V_1, E_1)$ and $G_2 = (V_2, E_2)$ are the same or isomorphic, if there is a bijection $F : V_1 \to V_2$ such that $(u, v) \in E_1$ iff $(F(u), F(v)) \in E_2$

Cycle or circuit

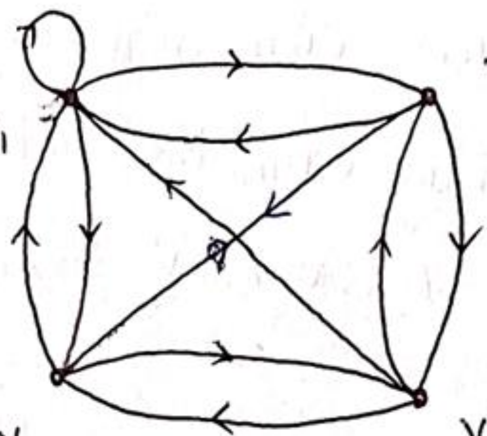
A path which originates and ends in the same vertex is called a cycle of circuit

A path is said to be simple if all the edges in the path are distinct.

A path in which all the vertices are traversed only once is called an elementary path.

Example

Consider the graph



Then some of the paths originating in vertex v_1 and ending in vertex v_3 are

$P_1 = (\langle v_1, v_2\rangle, \langle v_2, v_3\rangle)$

$P_2 = (\langle v_1, v_4\rangle, \langle v_4, v_3\rangle)$

$P_3 = (\langle v_1, v_2\rangle, \langle v_2, v_4\rangle, \langle v_4, v_3\rangle)$

$P_4 = (\langle v_1, v_2\rangle, \langle v_2, v_4\rangle, \langle v_4, v_1\rangle, \langle v_1, v_2$
$\langle v_2, v_3\rangle$

$P_6 = (\langle v_1, v_1 \rangle, \langle v_1, v_2 \rangle, \langle v_2, v_3 \rangle)$

Here, P_1, P_2 and P_3 are elementary path.

P_5 is simple path but not elementary.

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