ASSIGNMENT-4

Date :
P. No. :

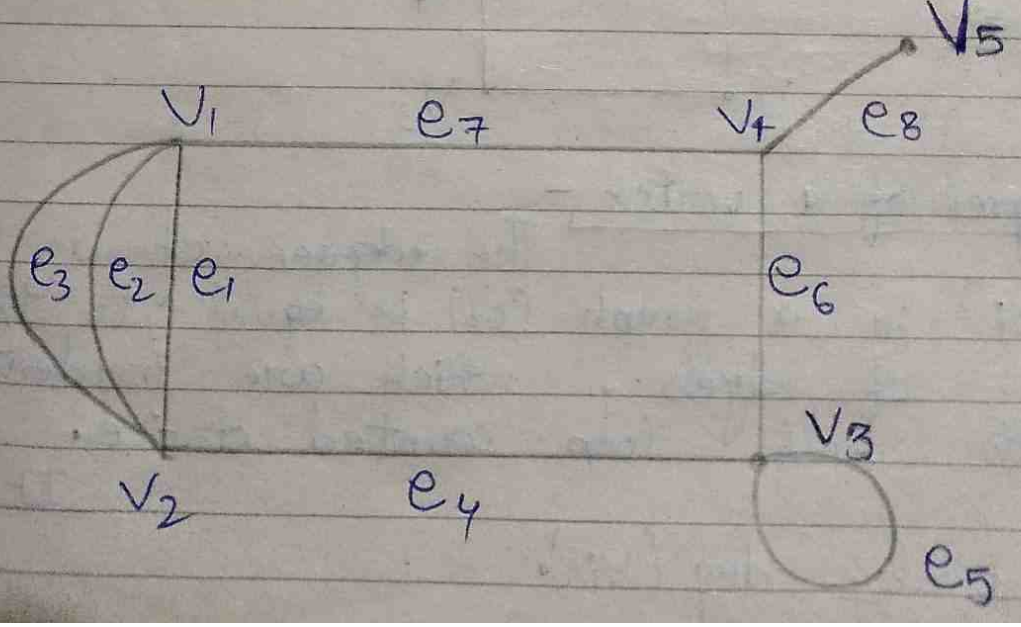
UNIT-5

"BOOLEAN ALGEBRA & GRAPH THEORY"

IMP

★ **Graph** -

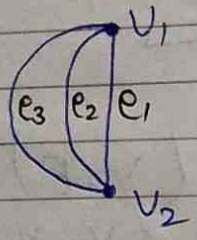
A graph $G = (V, E)$ consists of a set of object $V = \{V_1, V_2, V_3, \ldots\}$ whose elements are called vertices and a another set $E = \{E_1, E_2, E_3, \ldots\}$ whose elements are called edges and set of $\{V, E\}$ is called a graph.



★ **Shelf loop** - An edge is said to shelf loop if its both ∧ vertices are same.

★ **Parallel graph** - If there are two (OR) more than to having same pair of vertices, then such edges are called parallel edges.

Ex. =>



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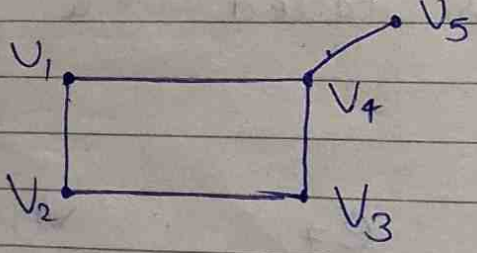
★ **Simple Graph** - A graph that has neither self loop nor parallel edge are called simple edge.

Ex. =>



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★ **Degree of a vertex** - The degree of a vertex $deg(V_i)$ in a graph (G) is equal to the no. of edges, which are incident on V_i with self loop counted twice. It is denoted by $deg(V_i)$.

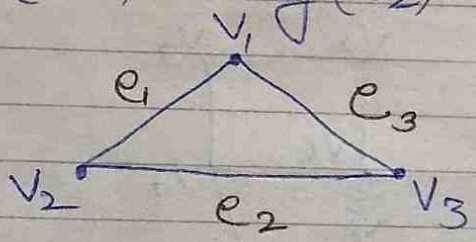
ex. ⇒ $\deg(V_1) = \deg(V_2) = \deg(V_3) = 4$

$\deg(V_4) = 3, \quad \deg(V_5) = 1$

★ Regular Graph :-

A graph (G) in which all vertices are of equal degree is called regular graph.

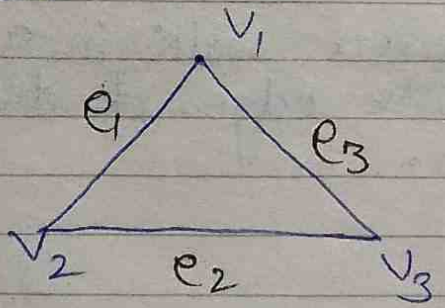
ex. ⇒ $\deg(V_1) = \deg(V_2) = \deg(V_3)$



★ Isolated Vertex :-

A vertex of degree zero is called isolated vertex, or an end vertex.

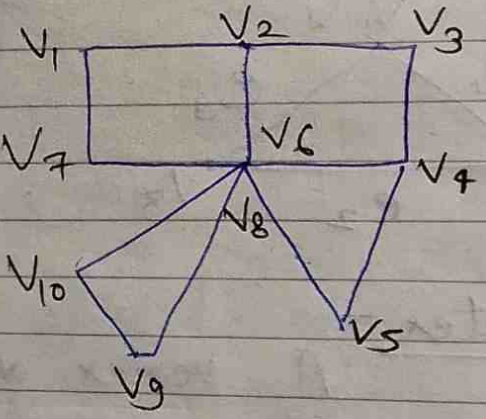
ex. ⇒



• $V_4 \rightarrow$ (V_4 is isolated vertex)

★ **Open Walk** – When terminal vertices are difference, then it is a open walk.
V_5 e_1 V_4 e_5 V_7 is a open walk.

★ **Connected Graph** – A graph (G) is called connected, if there is atleast one path b/w every pair of vertices. Otherwise it is disconnected.



★ **Euler graph** – A closed walk in a graph which include all the edges of the graph is euler graph.

★ Euler ~~Tree~~ –

A closed walk in a graph which include all the edges of the graph in euler graph.

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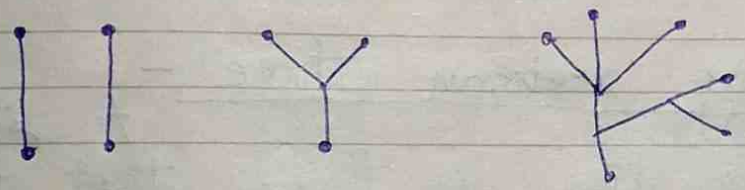
★ Tree –

A connected graph having no circuit is called tree.



★ Decision Tree –

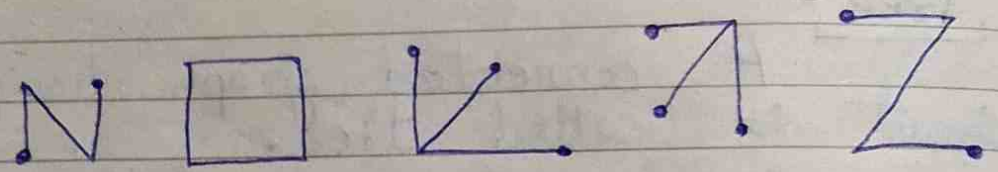
A decision tree are labelled rooted tree which occur in application specially in computer programming & computer algorithm.

The root represent a starting point later vertices represent later decision point, and one proceed downward to the tree,

④ Spanning Tree -

If $g = (V, E)$ is any connected graph, a spanning tree in G is a subgraph $T = (V, E')$ which is a tree.

Ex. -



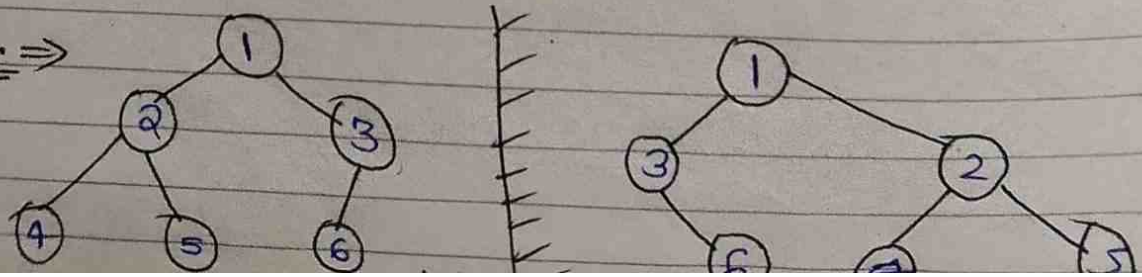
⑤ Binary decision tree -

A student must pass two of three test to pass a course. The binary decision tree appears in adjoining figure with F denoting fail, P denoting pass.

M.I.E ⑥ Isomorphic Tree -

Two trees are called isomorphic if one of them can be obtained from other by a series of flips, i.e by swapping left and right children of a no. of nodes. Two empty trees are isomorphic.

Ex. ⇒



★ Theoram -1 ⇒ The sum of the degrees of all vertices in a graph is equal to equal to twice the no. of edges.

★ Theoram - 2 ⇒ The max. no. of edges in a simple graph with n vertices is $\frac{n(n-1)}{2}$.

★ Theoram -3 ⇒ A graph (G) is disconnected if and only if its vertex set V can be portioned into two non-empty, disjoint subsets V_1 and V_2 such that there exists no edge in G whose one ends vertex is in subset V_2 and other end vertex is in subset V_2.

★ Theoram -4 ⇒ If a graph G (G may be connected or disconnected) has exactly two odd vertices, there must be path joining these two vertices.

★ Theoram -5 ⇒ Let G be simple graph with n vertices. If G, K components, then the max. no. of edges that G can have are

$$\frac{(n-k)(n-k+1)}{2}.$$

- **Theoram-6** - The sum of the degrees of all vertices in a graph is equal to twice no. of edges (i.e even).

★ **Walk** - A walk is graph G is define as finite alternating sequence of vertices & edges and to which begain to ends with vertices