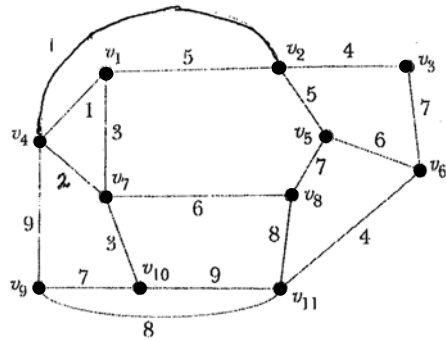


5. Define a *binary search tree* and its *height*. Let T be a binary search tree with t terminal vertices and height h , $h \geq 1$. Then show that $t \leq 2^{h-1}$.

6. Find a minimal spanning tree of the following graph:



M. SC. MATHEMATICS EXAMINATION, 2022

(2nd Year, 2nd Semester)

GRAPH THEORY II (THEORY)

PAPER – DSE - 06 (B4)

Time : 1 hour 15 minutes

Full Marks : 24

Answer *any Four* questions.

6×4

1. Define a *plane graph*. Let G be a plane graph with n vertices, e edges, f faces and k components. Then Show that $n - e + f - k = 1$.
2. What is a *Kuratowski subgraph*? If G is a graph with fewest edges among all nonplanar graphs without Kuratowski subgraphs, then show that G is 3-connected.
3. Prove that the 3-dimensional cube graph Q_3 is planar but its complement is nonplanar.
4. Let N be a (single source, single sink) transport network with a flow function F . Define a *quasipath* Q of N . When is Q called *F-unsaturated*? Prove that F is maximum if and only if there does not exist any *F-unsaturated* quasipath Q from the source vertex to the sink vertex.

[Turn over