Solution

First of all we can calculate the total number of edges in the original graph, By summing up the number of edges in the n input graphs and dividing it by $n-2$, Name it m.

Now if the original graph has at least one 0-degree vertex, one of the n graphs will have m edges in it, and therefore we can obtain the original graph. If not, then we can claim that the number of connected components in the original graph is the minimum of the number of connected components in the n input graphs. Therefore we have the size of output and we will name it k.

Now we erase any input graph that has more than k components, and the remaining graphs each will have k components. We acquire the size of connected components of graphs and sort them in a vector p_i. Thus we will be have a vector of sorted numbers for each of the remaining graphs, each with the size of k. Now we argue that if all of the original graph's connected components won't have the same size, then the element-wise maximum of p_i vectors will be the answer. It is easy to check if that is the case or not by looking at values of p_i.