

3 a. (i) In the network shown in Figure 2, Node S is the source node which is broadcasting to the other nodes following **neighbour elimination** based broadcasting. The key for timeout comparisons is $(timeout, ID)$; that is, if timeouts are the same, nodes with lower ID number will transmit first. For timeout, use formula $timeout = 1 / (\text{number of uncovered neighbours})$. List the nodes that will retransmit in the process, in the order of retransmission. After each transmission, list which nodes have timeouts and how long are these.

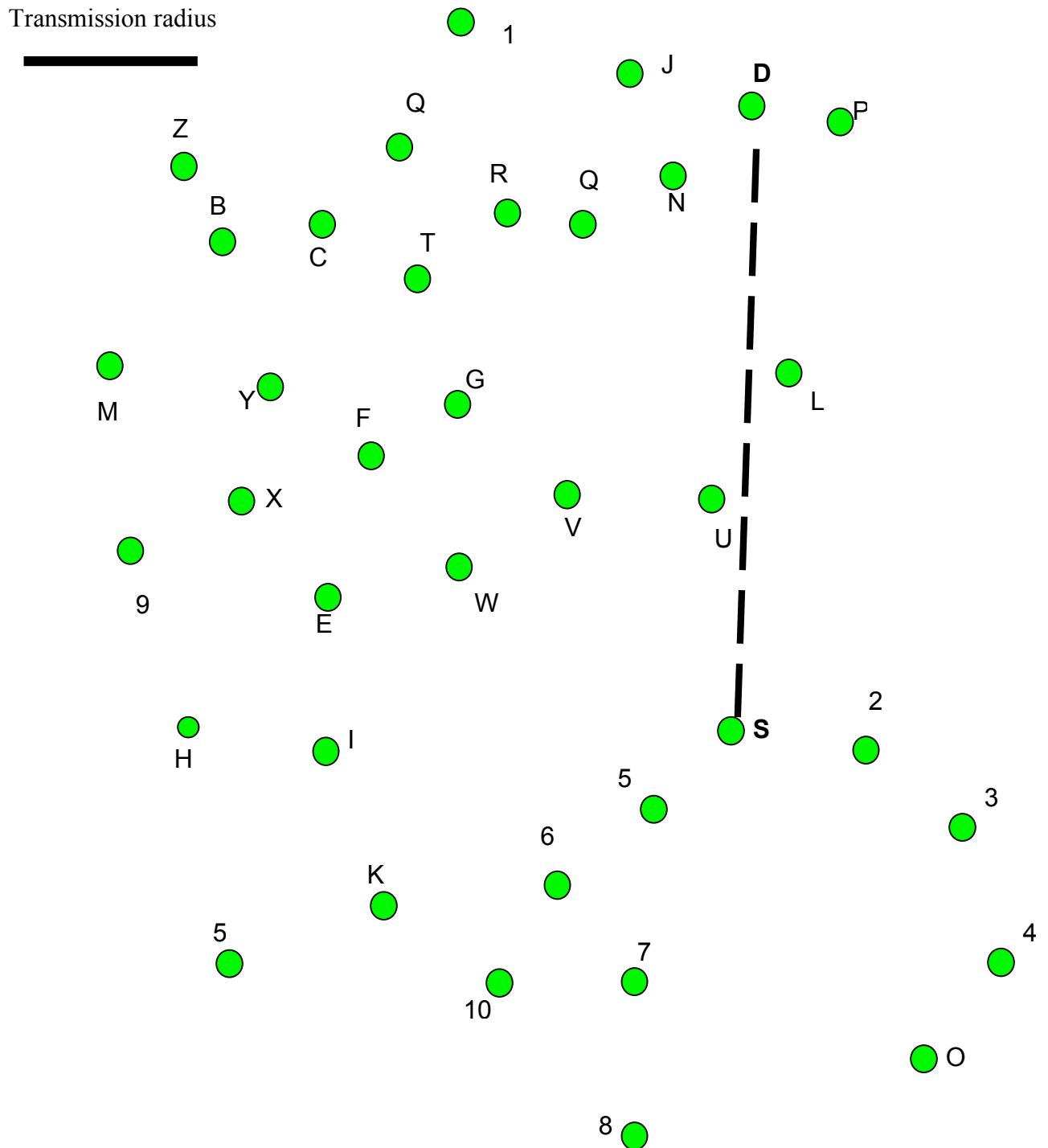
8 marks

(ii) Consider a variant of the same algorithm where the key is changed to $(timeout, \text{degree}, ID)$. That is, when few nodes have the same timeout, one with the largest degree (number of neighbours) will transmit first. If degrees are also same then ID is used to break the tie. Which of two methods is expected to result in broadcasting with fewer retransmissions and why?

2 marks

3 b. (i) Show the route taken when the GFG routing scheme is applied in the example shown in Figure 3, from source **S** to destination **D**. Apply two variants of the recovery scheme: 'left hand', and 'right hand' rule each time face routing starts. Note that face routing mode uses only edges of the Gabriel graph. Greedy routing stops when there is no closer neighbour to the destination than current node, and GFG then switches to face mode until a node is found that is closer to the destination than the node that started the face mode. Edges are not drawn, but transmission radius is indicated and needs to be applied (in case of doubt indicate your assumption, e.g. *TF* is not an edge). You can answer by simply listing (in the answer sheet) node names in the sequence of their appearance on your selected path.

8 marks



3 b (ii) Gabriel graph (GG) of a set of points is defined as follows. An edge AB belongs to GG if and only if the circle with diameter AB does not contain any other node from the set. Relative Neighborhood Graph (RNG) of a set of points is defined as follows. An edge AB belongs to RNG if and only if AB is not the longest edge in any triangle formed by points from the set. Consider two variants of GFG algorithm, one using GG and one using RNG as the planar graph in the face mode. Which of the two will result in smaller average hop count of routes and why?

2 marks