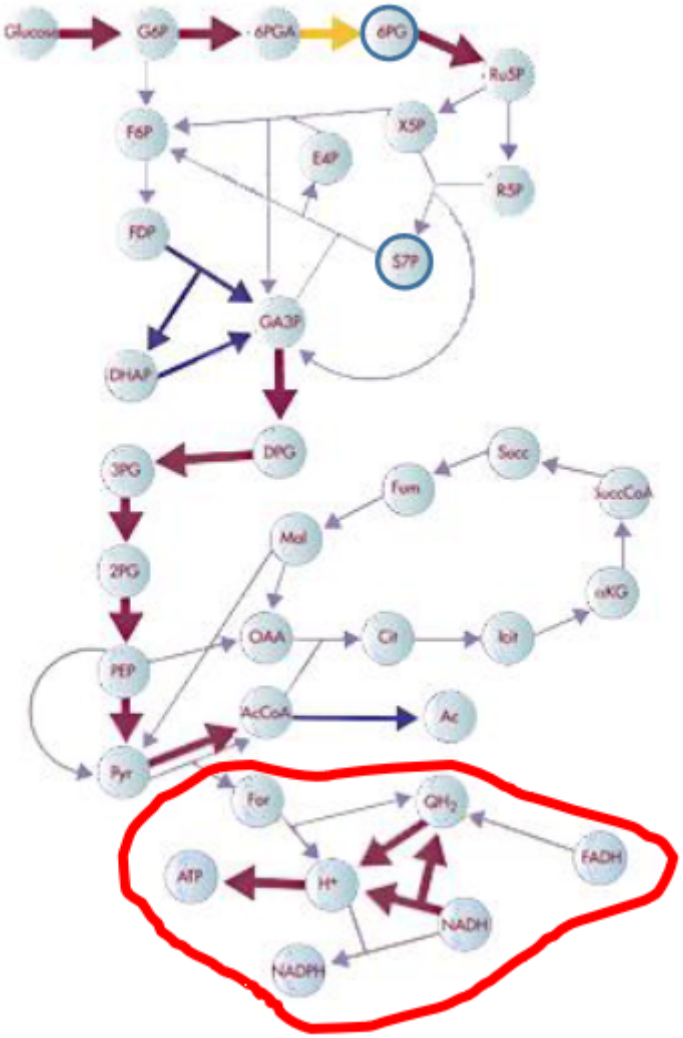
TOPIC 7 ASSESSMENT

Scenario 1:



2 Answer the following questions:
• Type of graph:
It is a directed graph

• What do nodes represent?
Nodes represent intermediate molecules inside the metabolism

• What do edges represent?
Edges represent the path that follows the metabolism with directions

• Build an adjacency matrix for the highlighted part of the network

$$\begin{bmatrix} x & For & QH_2 & FADH & ATP & H^+ & NADH & NADPH \\ For & 0 & 1 & 0 & 2 & 1 & 0 & 2 \\ QH_2 & 0 & 0 & 0 & 0 & 1 & 0 & 2 \\ FADH & 0 & 1 & 0 & 3 & 2 & 0 & 3 \\ ATP & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ H^+ & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ NADH & 0 & 1 & 0 & 2 & 1 & 0 & 1 \\ NADPH & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

• Find the node with the highest degree within the highlighted part of the network:
The node with the highest degree is :
FADH+

• Analyse closeness centrality within the highlighted part of the network and identify the most central node accordingly:
CC(For) = (7-1)/6 → 1
CC(QH2) = (7-1)/3 → 2
CC(FADH) = (7-1)/9 → 0.6
CC(ATP) = (7-1)/0 → No central
CC(H+) = (7-1)/1 →6 → Central
CC(NADH) = (7-1)/5 →1.2
CC(NADPH) = (7-1)/0 → No central

Therefore, the most central node is the H^+.

• Shortest path between 6PG and S7P (highlighted): From 6PG to Ru5P. Ru5P to X5P. From X5P to S7P.

• Analyze betweenness centrality for all the nodes in the shortest paths between 6PG and S7P and identify the most central node accordingly:
The most central is Ru5P º

• Perform a (visual) transitivity analysis in the whole network and identify hubs:
This is a directed network.
The highlighted zone is a cluster, it can be considered as a cluster also the first part, between glucose and the DPG.
As hubs we could label the H+ that is in the highlighted zone or the GA3P, because serve as a central node among many other nodes.