**Problem:**

A bacterial polysaccharide is composed of the repeating tetrasaccharide shown below.

\[
\begin{align*}
\rightarrow 2-\beta-L-Rhap-1 \rightarrow 4-\alpha-D-Galp-1 \rightarrow 3-\alpha-D-Glcp-1 \rightarrow \\
2 \uparrow \\
\alpha-L-Fucp-1
\end{align*}
\]

(A.) What sugar nucleotides were involved in the synthesis of this polysaccharide?

(B.) Draw the structure, e.g. Haworth structure, of the repeating tetrasaccharide.

(C.) The glycosyl linkages of the polysaccharide were determined by the preparation (sodium borodeuteride was used for the reducing agent) and GC-MS analysis of partially methylated alditol acetates. Draw the expected PMAA derivatives.

(D.) On the above PMAA structures, indicate the primary fragment ions observed on MS analysis.

(E.) Draw the oligosaccharide that would result from Smith degradation of the polysaccharide.