Compiler Construction

Construct the characteristic finite state machine for the following grammar.

\[
S \rightarrow A \ B \ \text{eof} \\
A \rightarrow A \ B \mid B \ a \\
B \rightarrow (A) \mid b
\]  

[6 marks]

Explain what is meant by the FOLLOW set for a non-terminal symbol in a grammar, and derive the FOLLOW sets for \( A \) and \( B \) in the above grammar.  

[4 marks]

Construct, with explanation, the SLR(1) action and goto matrices for the above grammar.  

[5 marks]

Illustrate how the SLR(1) parsing algorithm works for this grammar by showing the successive states of the parser stack and input stream while parsing

\[
b \ a \ b \ ( \ b \ a \ ) \ \text{eof}
\]  

[5 marks]