COL226: Programming Languages

Sat 06 Mar 2021 **Quiz 3** 30 minutes Max marks 10

Instructions:

1. Download the paper.
2. Write your name and entry number in the designated space on top and *do not forget to sign the honour statement below.*
3. Answer the question(s) in the appropriate space provided starting from this page.
4. Scan the paper with your completed answer.
5. Upload it on Gradescope 2002-COL226 page within the given time. *Make sure the first page with your name, entry no and signature is also the first page of your uploaded file*
6. Late submissions (within 2 minutes of submission deadline) on the portal will attract a penalty of 2 marks out of 10.
7. Email submissions after the closing of the portal will not be evaluated (You get a 0).
8. Uploads without the first page details (including signature) may be awarded 0 marks.

I abide by the Honour code that I have signed on my admission to IIT Delhi. I have neither given any help to anybody nor received any help from anybody or any site on the internet in solving the question(s) in this paper.

Signature: **Date:**

Consider the context-free grammar $G = \langle \{N\}, \{\mathtt{a}, +, *\}, \{S \to SS+ \mid SS* \mid \mathtt{a}\}, \{S\} \rangle$ and consider the string `aa+a*` generated by this grammar.

1. Give the leftmost derivation of the string.
2. Give the rightmost derivation of the string.
3. Give a parse tree for the string.
4. Is the grammar ambiguous or not? Justify.
5. What is the language generated by this grammar?
6. Is it possible, by modifying the grammar, to construct a recursive descent parser for the language described by the above grammar?
7. Indicate the reducing productions for the following right-sentential form: $SS+\mathtt{a}*\mathtt{a}+$