COL226: Programming Languages

Sat 17 Apr 2021 **Quiz 5** 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 20% of the total marks.
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 following CFG G which generates bit-sequences optionally separated by a single "binary point" (denoted by ".") which are to be interpreted as unsigned integers (if there is no binary point) or as unsigned rational numbers (if there is a binary point). $G = \langle N, T, P, S\rangle$ where $T = \{0, 1, .\}$, $N = \{S, L, B\}$ and P the set of productions is given by

$$\begin{array}{lcl} S & \rightarrow & L \mid L.L \\ L & \rightarrow & B \mid LB \\ B & \rightarrow & 0 \mid 1 \end{array}$$

Assume *val* (for the value denoted by a bit string) and *len* (for the length of a bit sequence) are attributes that may be associated with each non-terminal symbol.

1. Which of the attributes is synthesised and which is inherited? Justify your answer.
2. Write L-attributed definitions to compute the value of each string generated by this grammar. In case you require any other attributes to compute the value, specify them also in your semantic rules.