

B.Tech Third Year Mid-Semester Examination

Department: Computer Science and Engineering

Course Name: Compilers

Code: CS 346

Full Marks-60

Time: 2 hours

Answer ALL the questions

Make reasonable assumption whenever necessary. The notations carry the usual meanings. You can answer the question in any sequence. However the answers of all the components of any particular question should appear together

1. Consider the following grammar:

$$E \rightarrow TE', E' \rightarrow +TE' \mid \varepsilon, T \rightarrow FT', T' \rightarrow *FT' \mid \varepsilon, F \rightarrow (E) \mid \text{id}$$

Design a predictive parser for the given grammar (show the parsing table and necessary other steps).

Using that table, show how to parse the string: (id + id) * id

For each step, show what is on the stack, what is left in the input buffer, and what grammar rule is produced as output. 10+5+5

2. Consider the following grammar:

$$E \rightarrow E + T, E \rightarrow T, T \rightarrow T * F, T \rightarrow F, F \rightarrow (E), F \rightarrow \text{id}$$

Construct a SLR parser for the above grammar (hint: show the itemsets, parsing table etc.). Show the kernel and non-kernel items in each LR (0) set. Draw the DAG. 12+4+4

3. Consider the grammar:

$$S \rightarrow aSbS \mid bSaS \mid \varepsilon$$

(a) Show that this grammar is ambiguous by constructing two different leftmost derivations for the sentence abab.

(b) Construct the corresponding rightmost derivations for abab.

(c) Construct the corresponding parse trees for abab.

(d) What language does the grammar generate?

10

4. Convert the regular expression $(a|\varepsilon)(bc^*)$ to NFA (hint: use Thompson's construction method). Convert it into DFA. 10