

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2476

Roll No.

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B. Tech.

(SEM. VI) THEORY EXAMINATION 2010-11

COMPILER DESIGN

Time : 3 Hours

Total Marks : 100

Note : Attempt all questions.

1. Attempt any **four** parts of the following : **(5×4=20)**
 - (a) Explain the compilation with suitable block diagram. Also discuss the role of various phases of the compiler.
 - (b) Discuss the boot strapping of cross-compiler.
 - (c) Describe the task performed by following programs :
 - (i) Preprocessors
 - (ii) Assemblers
 - (iii) Loaders and Link-Editors.
 - (d) Discuss the algorithms for subset construction and computation of ϵ -closure.
 - (e) Show the construction of NFA for following regular expression.
 $(a | b)^* a (a | b) (a | b)$
 - (f) Explain how LEX tool may be used to create lexical analyser ?

2. Attempt any two parts of the following : (10×2=20)

- (a) Explain recursive-descent parsing. Consider the following grammar :

$$S \rightarrow aSa/aa$$

That generates all even length strings of a's except for the empty string. Construct a recursive-descent parser with backtracking for this grammar that tries the alternative aSa before aa. Show that the procedure for S succeeds on 2, 4, or 8 a's, but fails on 6 a's. Also give the language does your parser recognize.

- (b) Consider the following left recursive grammar and eliminate the left recursion. Also construct the predictive parsing table :

$$E \rightarrow E + T \mid T$$

$$T \rightarrow T * F \mid F$$

$$F \rightarrow a \mid b$$

- (c) Give the algorithm to construct LALR parsing table.

Construct the LALR parsing table for following grammar :

$$S \rightarrow AA$$

$$A \rightarrow aA$$

$$A \rightarrow b$$

3. Attempt any two parts of the following : (10×2=20)

- (a) Consider the following grammar and give the syntax directed definitions to construct parse tree. For the input

expression $4*7+1*2$ construct an annotated parse tree according to your syntax directed definition :

$$E \rightarrow E * T \mid T$$

$$T \rightarrow T * F \mid F$$

$$F \rightarrow \text{digit}$$

- (b) Discuss types of three address statements and their implementation with examples.
- (c) Give the syntax directed translation scheme to translate the while control construct. Also translate the following program segment into three address code :

```
while (a > b)
    if (c > d)
        c = c - d * e;
    else
        c = c + d * e;
```

4. Attempt any two parts of the following: **(10×2=20)**
- (a) Describe symbol table and its entries. Also discuss various Data Structure used for symbol table.
- (b) What is activation record ? Explain its organization. Also discuss various storage-allocation strategies.
- (c) Discuss how Access Links and Displays are used to access non-local names.

5. Attempt any **two** parts of the following : (10×2=20)

(a) Explain following code improving transformations with examples :

(i) Local and global elimination of common sub-expressions.

(ii) Copy propagation and dead code elimination.

(b) Explain following loop optimizations with examples :

(i) Local and global elimination of common sub-expressions.

(ii) Copy propagation and dead code elimination.

(c) Write short notes on following :

(i) Optimization of Basic Block.

(ii) Semantic Errors and its Recovery.