

Registration no:

Total Number of Pages: 02

M.TECH
CSPE202

Second Semester Examination ~~2018~~ 2019
COMPILER CONSTRUCTION

Time: 3 Hours
Max marks: 70

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Answer the following questions:

2 x 10

1.

- a) What is meant by boot strapping?
- b) What are the pros and cons of operator precedence parsing?
- c) What changes should be made in the semantic analyzer to add type casting?
- d) What is DAG? What are its applications?
- e) Write a regular expression to describe unsigned numbers.
- f) What is meant by Peephole optimization?
- g) Why SLR and LALR are more economical to construct than canonical LR?
- h) What do you mean by dangling reference?
- i) What is the use of algebraic transformation?
- j) What is the difference between activation of the procedure and the activation record?

2.

5 x 2

- a) The regular expression $(aa^* | bb^*)$ is given. Construct NFA for the expression and convert this NFA into DFA.
- b) Explain in detail the various phases of compiler. Consider the following fragment of C code.

```
float i,j;  
i=i*70+j+2;
```

Write the output at all phases of the compiler for this C code.

3.

5 x 2

- a) For the following grammar construct the syntax directed definition and generate the code fragment (translator) using S-attributed definition.

```
S → EN  
E → E+T  
E → E-T  
E → T  
T → T*F  
T → T/F  
T → F  
F → (E)  
F → digit  
N → ;
```

Also evaluate the input string $2*3+4$; with parser stack using LR parsing method.

- b) Compare three different storage allocation strategies.

4.

Show that the following grammar

$$S \rightarrow Aa \mid bAc \mid dc \mid bda$$

$$A \rightarrow d$$

is LALR(1) but not SLR(1).

5 x 2

5.

a) Using back patching, generate an intermediate code for the following expression.

$$A < B \text{ OR } C < D \text{ AND } P < Q$$

b) Explain the error recovery in LR parsing with a suitable example.

5 x 2

6.

a) Discuss different symbol table organizations. Explain how scope rules and the block structure of a programming language influence symbol table organization strategies.

b) Generate the code for the following statement for the target machine (target machine is a byte addressable machine with 4 bytes to a word and N general purpose registers). Assume all variables are static. Assume three registers are available.

$$a[i][j] = b[i][k] * c[k][j]$$

5x2

7.

a) What is a data flow graph? Write down the equations for the definitions of the variables, variable available at the input of each node, and the live variables on the exit of a node. Relate these equations for optimizing the code.

b) What is the purpose of next use information in code generation? Explain with examples.

5x2

8.

a) Consider the following grammar.

$$E \rightarrow 5 + T \mid 3 - T$$

$$T \rightarrow V \mid V * V \mid V + V$$

$$V \rightarrow a \mid b$$

i) Do left factoring.

ii) Construct first and follow table.

iii) Construct predictive parse table.

b) Write short notes on

i) Compilation for high performance architecture

ii) Procedural and Interprocedural Optimization