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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Sixth Semester, B.E. - Computer Science and Engineering

Semester End Examination; May/June - 2018

Compiler Design

Time: 3 hrs

Max. Marks: 100

Note: Answer **FIVE** full questions, selecting **ONE** full question from each unit.

UNIT - I

- 1 a. With a neat diagram, explain the phases of a compiler. Show the translation made by each of the phases for the statement $a = b + c * 10$ where a , b and c are real. 12
- b. Explain the input buffering strategy used in lexical analysis phase. 8
- 2 a. With neat diagram, explain the role of lexical analyzer. 6
- b. Define the term Token, Pattern and Lexeme. Find the same for the following program fragment : 8
- ```
printf("Total = %d\n average = %f\n", score, area);
```
- c. Define regular expression and write transition diagram to recognize the tokens given below : 6
- i) Identifier      ii) Unsigned number

## UNIT - II

- 3 a. Define Left Recession and Left Factoring. Give the algorithm used for eliminating Left Recursion. 8
- b. Construct the predictive parsing table for the given grammar and show the parsing steps for the string "uvuvx2" 12
- $$S \rightarrow uB2$$
- $$B \rightarrow Bv \mid vuE \mid vxuE \mid ByE$$
- $$E \rightarrow v \mid vx$$
- 4 a. Briefly explain the problem associated with Top Down Parsing. 6
- b. Explain Non-recessive Predictive Parsing algorithm. 6
- c. Compute First( ) and Follow( ) symbols for the following grammar and check whether grammar is LL(1) : 8
- $$S \rightarrow iEtSS'/a$$
- $$S' \rightarrow eS/\epsilon$$
- $$E \rightarrow b$$

## UNIT - III

- 5 a. Explain the working of shift reduce parser and also conflicts that may arise during shift reduce parsing with an example. 6
- b. Write LR parsing algorithm. 6

- c. Construct LR(0) item for given grammar :  $A \rightarrow (A) / a$  8
- 6 a. Write the algorithm for constructing set of LR(1) items. 8
- b. Construct LALR parsing table for the following grammar :
- $S \rightarrow CC$  12
- $C \rightarrow cC / d$

#### UNIT - IV

- 7 a. Define the following terms with an example :
- i) Syntax directed definition
- ii) Inherited attribute 10
- iii) Synthesized attribute
- iv) Annotated parse tree
- b. Give the syntax directed definition to process a simple variable declaration in C and draw dependency graph for  $int id_1, id_2, id_3$ . 10
- 8 a. Explain in detail different dynamic storage allocation strategies. 10
- b. Describe an activation record. Explain the purpose of each item in an activation record with an example. 10

#### UNIT - V

- 9 a. What is DAG? Write DAG for the expression : 4
- $((x+y) - ((x+y) * (x-y))) + ((x+y) * (x-y))$ .
- b. Name the different types of representation of 3-address code and translate the given arithmetic expression into each type. 6
- $a - b * c + d - a + b$
- c. Describe the method of generating intermediate code for the branching statement (if/if-else). 10
- 10 a. Briefly explain main issues in code generation. 10
- b. Explain the code generation algorithm and generate code for the following expression : 10
- $x = (a - b) + (a + c)$ .

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