

Roll No. ....

**322652(22)**

**B. E. (Sixth Semester)**  
**EXAMINATION, Nov-Dec 2021**  
**(New Scheme)**  
**(Branch : CSE)**  
**COMPILER DESIGN**

*Time : Three Hours ]*

*[ Maximum Marks : 80*

*[ Minimum Pass Marks : 28*

**Note :** Part (a) of every question is compulsory. Attempt any *two* parts from (b), (c) and (d). All questions carry equal marks.

1. (a) List out *two* significances of bootstrapping of a compiler. 2
- (b) Convert the given language  $(a+b)^*abb$  into DFA using subset construction algorithm. Also minimize the no. of states to have the minimized DFA. 7
- (c) Draw the transition diagram that recognizes : 7
  - (i) Identifier with underscore
  - (ii) Signed integer
  - (iii) Signed real number

- (iv) White space
- (v) C-relational operators
- (vi) Floating point exponent constant.
- (vii) GOOOO.....GLE.
- (d) Write LEX source program specification for the token BEGIN | ENG | THEN | ELSE | letter (letter | digit)\* | digit+ | < | <= | = | <> | > | >= . 7
2. (a) What is the problem of left-recursion in top-down parser ? Give suitable example. 2
- (b) For the following grammar with E as the start symbol, find the FIRST and FOLLOW sets of each of the non-terminal : 7

$$E \rightarrow TE'$$

$$E' \rightarrow +TE' | \epsilon$$

$$T \rightarrow FT'$$

$$T' \rightarrow *FT' | \epsilon$$

$$F \rightarrow (E) | id$$

Also, construct the predictive parsing table for the above mentioned grammar.

- (c) For the following grammar : 7

$$E \rightarrow E + E$$

$$E \rightarrow E * E$$

$$E \rightarrow (E)$$

$$E \rightarrow id$$

Generate the sequence of actions taken by the shift-reduce parser for parsing the input string  $id_1 + id_2 * id_3$ .

- (d) Explain, how operator precedence parsing relations table is created for evaluating arithmetic expressions with example. 7
3. (a) What is synthesized attributes? 2
- (b) Give a syntax-directed translation scheme for a "desk calculator" and show the sequence of moves made by bottom-up-parser of the input  $23 * 5 + 4 \$$ . 7
- (c) Translate the expression  $a := b * -c + b * -c$  into 7
- (i) Quadruples
- (ii) Triples
- (iii) Indirect triples
- (d) Translate the following statement into the equivalent three-address code : 7
- If  $(a > b \ \&\& \ c < d)$   $sum = sum + x_i$   
 else  $sum = sum - x_i$
4. (a) What is symbol table? 2
- (b) What is the use of activation record? Explain different fields in the activation record. 7



- (c) Write short notes on the following : 7
- (i) Parameter parsing technique
  - (ii) Activation trees
- (d) Differentiate between static, stack and heap allocation strategies. 7
5. (a) What is DAG ? 2
- (b) Explain in brief issues in the design of the code generator. 7
- (c) Write short notes on the following : 7
- (i) Global data flow analysis
  - (ii) Induction variable elimination
- (d) Construct the DAG for the following expressions : 7

$$a + a * (b - c) + (b - c) * d$$