2013

Time: 3 hours

Full Marks: 80

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer from both the Groups as directed.

Group – A

(Objective-type Questions)

1. Choose the correct answer for any ten of the following: $2 \times 10 = 20$

   (a) Symbol fable can be used for:
      
      (i) Checking type compatibility
      (ii) Suppressing duplicate error messages
      (iii) Storage allocation
      (iv) All of these

   (b) Which data structure is mainly used during shift-reduce parsing?
      
      (i) Pointers

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(Turn over)
(ii) Arrays
(iii) Stacks
(iv) Queues

c) Compiler is divided into mainly two parts:
(i) Semantic Analyzer and Syntax Analyzer
(ii) Symbol table and Lexical Analyzer
(iii) Analysis analyzer and Semantic analyzer
(iv) None of the above

d) LEX and YACC are the tools used for automatically generating:
(i) Lexical Analyzer
(ii) Semantic Analyzer
(iii) Syntactic Analyzer
(iv) Symbol Table

e) Which of the following is not an intermediate code form?
(i) Postfix notation
(ii) Syntax trees
(iii) Three address codes
(iv) Quadruples
(f) Which one of the following error will not be detected by the compiler?
   (i) Lexical error
   (ii) Syntactic error
   (iii) Semantic error
   (iv) Logical error

(g) Regular expression are closed under:
   (i) Union
   (ii) Concatenation
   (iii) Kleene star
   (iv) All of the above

(h) If a grammar is in LALR(1), then it is necessarily:
   (i) LL(1)
   (ii) SLR(1)
   (iii) LR(1)
   (iv) None of these

(i) _______ grammars are known as context sensitive grammars.
   (i) Type 0
   (ii) Type 1

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(iii) Type 2
(iv) Type 3

(j) A basic block can be analyzed by:
   (i) DAG
   (ii) Flow Graph
   (iii) Graph with cycles
   (iv) None of these

(k) A Lexical Analyser identifies:
   (i) =
   (ii) *
   (iii) /
   (iv) All of the above

(l) A top down parser generates:
   (i) Leftmost derivation
   (ii) Rightmost derivation
   (iii) Leftmost derivation in reverse
   (iv) Rightmost derivation in reverse

**Group – B**

**Long-answer Type Questions**

Answer any four questions.

2. Explain the different phases of the compiler with the help of a block diagram.  

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3. (a) Describe the contents of a symbol table. Describe various data structures used to create a symbol table.

(b) What is the objective of intermediate code generation? What are the different forms of intermediate code generated by intermediate code generation phase? \[ 7+8 = 15 \]

4. (a) Given the grammar \( S \rightarrow aSbS \mid bSaS \mid a \):

(i) Describe the language it generates

(ii) Show that this grammar is ambiguous by constructing two different leftmost derivations for the sentence \textit{abab}.

(b) Construct DFA from the regular expression \( L = (a \mid b)^* ab. \)

(c) Write the procedure to minimize the number of states in a DFA with the help of an example. \[ 5+4+6 = 15 \]

5. (a) Discuss the relevance of regular expression into Lexical Analyzer.

(b) Construct a regular expression for an unsigned number defined in C language.

UK – 18/3 (5) (Turn over)
6. (a) Explain inherited attribute and synthesized attribute for syntax directed translation with suitable example.

(b) What is DAG? Why DAG is used in the process of compiler construction? Construct the DAG for the following statement:

\[ Z = X - Y + X^*Y^*U - VW + X + V \]

7. (a) Explain the "Shift-Reduce" parsing technique with the help of an example.

(b) Explain, in detail, how three address codes are generated and implemented.

8. Write short notes on any three of the following:

(a) LEX and YACC
(b) SLR parser
(c) Activation record
(d) Loop optimization
(e) Data flow analysis

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