Code No: **R31051**

R10

Set No. 1

III B.Tech I Semester Supplementary Examinations, June - 2015
COMPILER DESIGN
(Computer Science and Engineering)

Time: 3 hours   **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
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1 a) What are compiler & interpreter? Write the differences between a compiler and   [7]
        an interpreter.
    b) What is a preprocessor? Explain various functions of a preprocessor.   [8]

2 a) Explain the role of lexical analyzer in compiler construction process.   [8]
    b) Construct DFA for the Regular Expression (a/b)*abb(a/b)*.   [7]

3   Convert the following grammar into LL(1) grammar and construct the LL(1)   [15]
        Parsing table:
        $E \rightarrow E + T \mid T$
        $T \rightarrow T * F \mid F$
        $F \rightarrow (E)/id$

4 a) Write about SR conflicts and RR conflicts of shift reduce parsers.   [5]
    b) Explain the way to implement a shift-reduce parser using a stack by taking an   [10]
        input string for a grammar.

5 a) What is an augmented grammar? Describe with an example.   [5]
    b) Construct the CLR parsing table for the following grammar: [10]
        $S \rightarrow L=R \mid R$
        $L \rightarrow *R \mid id$
        $R \rightarrow L$

6 a) Explain briefly various data structures used to implement the symbol table.   [8]
    b) Construct the syntax-directed definition to produce a syntax trees for   [7]
        assignment statements.

7 a) Write the quadruples, triples and indirect triples for the expression: [9]
        -a + a * (b + c) + (b + c) * d.
    b) Explain constant folding optimization technique with an example.   [6]

8 a) Explain the code generation algorithm function getreg( ) with an illustrative   [8]
        example.
    b) Give the procedure for constructing DAG.   [7]

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Code No: **R31051**   **R10**   Set No. 2

Time: 3 hours   Max. Marks: 75
Answer any FIVE Questions
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1 a) What are pass and phase? Write the differences between a pass and a phase in   [5]
       the context of compiler construction.
   b) Explain various phases in the construction of a compiler.   [10]

2 a) Design a FA that accepts a language over the alphabet $\sum$ = {0, 1, 2} where the   [7]
       decimal equivalent is divisible by 3.
   b) Give the complete specification of LEX tool and describe various section of it.   [8]

3   Convert the following grammar into LL(1) grammar and construct the LL(1)   [15]
       Parsing table:
                    R→R "|'R|RR|R*|(R)|a|b

4 a) Write down the advantages and disadvantages of LR parsers.   [6]
   b) Explain the various actions performed by shift-reduce parsers with an example.   [9]

5 a) How to detect handle and reduce handle in LR parsers?   [5]
   b) Construct the LALR parsing table for the following grammar: [10]
                    S→aAd | ace | bAe
                    A→c

6 a) Construct the syntax directed definition to convert infix notation into postfix [7]
       notation.
   b) Explain the storage allocation scheme for a block structured language.   [8]

7 a) Write the quadruples, triples and indirect triples for the expression: [9]
       b* – (c – d) + b* a – (c – d)
   b) Explain common sub expression elimination optimization technique with an   [6]
       example.

8 a) What are DAGs and how are they useful in implementing transformations on   [8]
       basic blocks?
   b) Explain the importance of register allocation with respect to optimization.   [7]

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Set No. 3

COMPILER DESIGN
(Computer Science and Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
*****

1 a) Write about a brief note on various tools available for compiler construction. [7]
   b) Describe the functionality of compilers in a typical language processing system. [8]

2 a) What are the reasons for separating lexical analysis from syntax analysis? [5]
   b) What is regular expression? Write the regular expression following. [5]
      i) Accepts all strings of 0's & 1's which and with 01.
      ii) Accepts all strings of 0's & 1's, whose 9th position from the right end is 1.
      iii) Equal no of 1's & 0's
   c) What is Transition diagram? Explain with examples. [5]

3 Convert the following grammar into LL(1) grammar and construct the LL(1) Parsing [15]
   table:

   bexpr → bexpr **or** bterm | bterm
   bterm → bterm **and** bfactor | bfactor
   bfactor → **not** bfactor | (bexpr) | **true** | **false**

4 a) Write the differences between top down parsers and bottom up parsers. [5]
   b) Consider the following grammar [10]
      E→EBE | id
      B→+ | - | * | =
      Convert the following grammar into operator grammar. Define precedence relations
      among the terminals and show how to use a stack algorithm to parse the string " id +
      id - id * id

5 a) Write an algorithm to find LR(0) items. [6]
   b) Consider the following grammar and construct the CLR parsing table: [9]
      S→C
      C→cC
      C→d

6 a)   Give the syntax-directed definition for a desk-calculator. [7]
   b) Explain the method of handling fixed length data and variable length data. [8]

7 a) Write the quadruples, triples and indirect triples for the expression: [9]
       (a+b) * (c+d) * (a+b+c)

   b) Explain loop optimization technique with an example. [6]

8 a) Construct DAG for the following basic block: [7]
       D:=B – C
       E:=A+B
       B:=B+C
       A:=E – C

   b) Explain about global register allocation strategy for loops. [8]

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1 a) What is a cross compiler? What are the advantages of boot straping process? [7]
   b) Describe the need and functionality of linkers, assemblers and loaders. [8]

2 a) Give the LEX specification to identify reserved words and identified in C. [7]
   b) What is the role of lexical analysis? Give examples [5]
   c) Differentiate between lexical analysis and parsing. [3]

3 Convert the following grammar into LL(1) grammar and construct the LL(1) [15]
   Parsing table:
   $S \rightarrow iEtS \mid iEtSeS$
   $T \rightarrow b$

4 a) Write the differences between LL parsers and LR parsers. [5]
   b) Consider the following grammar [10]
       Para $\rightarrow$ Sentence Rp | Sentence
       Rp $\rightarrow$ b Sentence Rp | Sentence
       Sentence $\rightarrow$ word b Sentence | word
       word $\rightarrow$ letter * word | letter
       letter $\rightarrow$ id
       (Note: Here b is a blank space)
       Convert the following grammar into operator grammar. Define precedence
       relations among the terminals and show how to use a stack algorithm to parse the
       string " id * id b id * id

5 a) How many conflicts occur in DFA with LR(1) items for the following grammar? [5]
       $S \rightarrow SS \mid a \mid c$
   b) Construct the LR Parsing table for the following grammar: [10]
       $E \rightarrow E + T \mid T$
       $T \rightarrow T * F \mid F$
       $F \rightarrow (E)/id$

6 a) Explain with advantages and disadvantages of stack and heap storage allocation [8]
       strategies for strings and records.
   b) Construct the Syntax Directed Translation scheme to convert a given arithmetic [7]
       expression into three address code.

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7 a) Write the quadruples, triples and indirect triples for the expression: [9]
       – (a+b) + (c+d) * (a+b+c)

   b) Explain dead code elimination optimization technique with an example.   [6]

8 a) What is machine dependent code optimization? How is it different? Explain with   [7]
       examples.

   b) What is peephole optimization? Mention the transformations that are   [8]
       characteristic of peephole optimizations.

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