R13

III B. Tech I Semester Regular/Supplementary Examinations, October/November- 2017
COMPILER DESIGN
(Computer Science and Engineering)

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
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PART –A

1	a)	Write the role of preprocessor in language processing.	[3M]
	b)	Give an example to eliminate the left recursion with rules.	[4M]
	c)	What is dangling else ambiguity? Give example.	[4M]
	d)	Generate three address code for the given pseudo code	[4M]
		*while(i<=100) { A=A/B*20; ++i; print(A value) }*	
	e)	Write the fields and uses of symbol table.	[3M]
	f)	For the code given in Q.1(d) generate the basic blocks and write the rules.	[4M]

PART -B

2	a)	What are the different phases of compiler in synthesizing the target program? Explain with an example.	[8M]
	b)	How to recognize various tokens of high level language program? Write the regular expressions and transition diagrams for each.	[8M]
3	a)	How to prove a grammar G: *bexpr➔bexpr or bterm\bterm, bterm➔bterm and bfactor\bfactor, bfactor ➔ not factor\(bexpr)\true\false* is LL(1)?	[6M]
	b)	Construct the LL(1) parse table for the above grammar G.	[10M]
4	a)	Explain the structure of LR parsers. How they are different from LL parsers?	[4M]
	b)	Build LR(0) parser and check the validity of the input string *"id+id*id "* by the LR(0) parser for the given grammar *E➔E+T/T, T➔T*F/F, F ➔(E)/id*	[12M]
5	a)	What is syntax directed translation? How it is different from translation schemes? Explain with an example.	[8M]
	b)	Translate the given expression into Quadruples, triples and indirect triples *(a+b)*(c+d)+(a*b/c)*b+60*. And list advantages and disadvantages.	[8M]
6	a)	What is reference counting? Explain how they are used in garbage collection.	[8M]
	b)	Efficient Register allocation and assignment improves the performance of object code-Justify this statement with suitable examples.	[8M]
7	a)	Differentiate various techniques used for machine independent and dependent optimizations.	[8M]
	b)	Explain how code motion and frequency reduction used for loop optimizations?	[8M]

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Code No: RT31051

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SET - 2

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PART –A

1	a)	Write the regular definition for arithmetic expressions.	[3M]
	b)	What are the rules for constructing first () function?	[4M]
	c)	Discuss the role of Action and Goto functions in LR parser?	[4M]
	d)	How to generate polish notation using translation schemes?	[4M]
	e)	Write various forms of object code generated in code generation phase.	[4M]
	f)	Give the organization of optimizing compiler.	[3M]

PART –B

2 a) What are the cousins of compiler? Explain their operations in processing high level language.   [8M]

   b) Describe the following i) Reasons for separating scanner and parser
                              ii) Lexical Errors.   [8M]

3 a) Prove that the given grammar is ambiguous and eliminate ambiguity in it.   [8M]
      G: S →iEtSeS\iEtS\a, E →b\c\d

   b) Construct the recursive descent parser for G: *bexpr→bexpr or bterm\bterm,*   [8M]
      bterm →bterm and bfactor\bfactor, bfactor → not factor\(bexpr)\true\false.
      What are the limitations of it?

4 a) What is the importance of look ahead symbol in LR(1) parser? Construct the canonical LR parser for *G: S →L=R\R, L →*R\id, R →L*   [12M]

   b) Explain the rules to check the acceptance of input string : **id=*id*   [4M]

5 a) Differentiate bottom up and top down evaluation of semantic rules for arithmetic expressions.   [8M]

   b) If **(a< b+c *20)**   [8M]
      {   a =a* b – 50
      **   d = (a/b) + 25;**
      **   print (a,d)**
      }
      For the given code generate three-address code.

6 a) What is runtime stack? Explain storage allocation strategies used for recursive procedure calls.   [8M]

   b) Can we reuse the symbol table space? Explain through an example.   [8M]

7 a) Write the algorithm to generate basic blocks and flow graph for quick sort algorithm.   [8M]

   b) Apply the code optimization techniques on flow graph generated for quick sort.   [8M]

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SET - 3

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PART –A

1	a)	Draw the transition diagram for comments.	[3M]
	b)	Write the rules to construct follow() function.	[4M]
	c)	Differentiate LR(0) and LR(1) items.	[4M]
	d)	Write about dependency graphs in syntax directed translations.	[4M]
	e)	What is run time environment? Give the structure.	[3M]
	f)	At what levels code can be optimized by user and compiler? Discuss.	[4M]

PART -B

2 a) What do you mean by front end in the compiler design? Show the output produced by it in different stages for *a:=b*c/36*; where a, b and c are real numbers. [10M]

   b) Explain the way in which high level languages are processed by interpreter and compiler. [6M]

3 a) Check whether the given grammar is LL(1) or not? [8M]
   G: S →Aa|bAc|Bc|bBa, A →d, B →d

   b) With neat sketch explain the structure of non-recursive predictive parser. How to handle errors in it. [8M]

4 a) List out and explain the rules to construct simple precedence relation for a context free grammar. [8M]

   b) Construct the operator precedence parse table for E→EAE|(E)|-E|id, A→+|-|*|/|↑ [8M]

5 a) Explain the type system in type checker? Write the syntax directed definition for type checker. [8M]

   b) What is syntax directed translation? Write the semantic rules for [8M]
   D →TL, T →int|real, L→L,id|id

6 Explain the following :
   a) Symbol table organization techniques. [8M]
   b) Peephole optimization techniques. [8M]

7 a) Write about the techniques in local and global transformations. [8M]

   b) What do you mean by inter procedural optimization? Explain with examples. [8M]

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PART –A

1	a)	Differentiate the features of linear analysis and hierarchical analysis.	[3M]
	b)	What do you mean by LL(1) grammar? Give example.	[4M]
	c)	What is handle pruning? Give an example.	[4M]
	d)	Write about order of evaluation of semantic rules in syntax directed translation.	[3M]
	e)	How to construct the flow graph for intermediate code?	[4M]
	f)	What is copy propagation and dead code elimination?	[4M]

PART -B

2 a) What is the relationship with lexical analyzer, regular expressions and transition diagram? Give an example. [8M]

b) Explain different modules used for language processing. [8M]

3 a) What are the preprocessing steps required for predictive parse table construction? Consider the grammar
$S \rightarrow ACB|CbB|Ba, A \rightarrow da|BC, B \rightarrow g|\varepsilon, C \rightarrow h| \varepsilon$ [8M]

b) Construct the predictive parse table for the above grammar. And also check for the validity of the input string of your choice. [8M]

4 Explain the following:
a) Usage of precedence and association rules to handle shift reduce conflicts in LR parsers. [6M]

b) Error recovery LR parsers [5M]

c) Shift reduce parsing [5M]

5 a) What is an Abstract syntax tree? How to construct it using *mknode(), mkleaf()* functions? Give an example. [8M]

b) What is type expression? How to construct them using various type constructors? Explain. [8M]

6 a) What is scope of variable? Write about various ways to access non local variables. [8M]

b) Generate target code from sequence of three address statements using simple code generator algorithm. [8M]

7 a) What is machine independent optimization? What are the different techniques used for it. [8M]

b) How to schedule the instructions to produce optimized code? Explain. [8M]

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