SRM VALLIAMMAI ENGNIEERING COLLEGE

SRM Nagar, Kattankulathur – 603203.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

QUESTION BANK

SUBJECT : CS8602 – COMPILER DESIGN

SEM / YEAR : VI/III

UNIT I -INTRODUCTION TO COMPILERS			
Structure of a compiler – Lexical Analysis – Role of Lexical Analyzer – Input Buffering – Specification of Tokens – Recognition of Tokens – Lex – Finite Automata – Regular Expressions to Automata – Minimizing DFA.			
PART-A (2 - MARKS)			
Q. No	**QUESTIONS**	**Competence**	**BT Level**
1.	**Define** tokens, patterns and lexemes.	Remember	BTL-1
2.	**Classify** approach would you use to recover the errors in lexical analysis phase.	Apply	BTL-3
3.	**Apply** the regular expression for identifier and white space.	Apply	BTL-3
4.	**Point out** why is buffering used in lexical analysis? What are the commonly used buffering methods?	Analyze	BTL-4
5.	**Define** transition diagram for an identifier.	Remember	BTL-1
6.	**Compare** syntax tree and parse tree.	Analyze	BTL-4
7.	**Summarize** the issues in a lexical analyzer.	Evaluate	BTL-5
8.	**Define** buffer pair.	Remember	BTL-1
9.	**Differentiate** the features of DFA and NFA.	Understand	BTL-2
10.	**State** the interactions between the lexical analyzer and the parser.	Remember	BTL-1
11	**Explain** parse tree and construct a parse tree for –(id + id)	Evaluate	BTL-5
12.	**Describe** the operations on languages.	Remember	BTL-1
13.	**List** out the phases of a compiler.	Remember	BTL-1
14.	**Generalizes** the advantage of having sentinels at the end of each buffer halves in buffer pairs.	Create	BTL-6
15.	**Classify** the four software tools that generate parser.	Analyze	BTL-4
16.	**Discuss** Regular expression and the Algebraic properties of Regular Expression.	Understand	BTL-2
17.	**Formulate** the regular expressions are used though the lexical constructs of any programming language can be described using context free grammar.	Create	BTL-6
18.	**Apply** a grammar for branching statements.	Apply	BTL-3
19.	**Express** the main idea of NFA? And discuss with examples $(a/b)^*$	Understand	BTL-2
20.	**Define** lex. Discuss the components of a lex.	Understand	BTL-2

<table>
<tr><th colspan="5">PART-B (13- MARKS)</th></tr>
<tr><td>1.</td><td>Describe the various phases of compiler with suitable example</td><td>(13)</td><td>Remember</td><td>BTL1</td></tr>
<tr><td>2</td><td>(i)Give the structure of compiler
(ii)Analyze structure of compiler with an assignment statement</td><td>(4)
(9)</td><td>Analyze</td><td>BTL4</td></tr>
<tr><td>3.</td><td>(i).Discuss in detail about the role of Lexical analyzer with the possible error recovery actions.
(ii)Describe in detail about issues in lexical analysis.</td><td>(7)
(6)</td><td>Understand</td><td>BTL2</td></tr>
<tr><td>4</td><td>(i)Describe the Input buffering techniques in detail.
(ii)Discuss how a finite automaton is used to represent tokens and perform lexical analysis with examples.</td><td>(7)
(6)</td><td>Remember</td><td>BTL1</td></tr>
<tr><td>5</td><td>Summarize in detail about how the tokens are specified by the compiler with suitable example.</td><td>(13)</td><td>Understand</td><td>BTL2</td></tr>
<tr><td>6</td><td>Define Finite Automata. Differentiate Deterministic Finite Automata and Non-Deterministic Finite Automata with examples.</td><td>(13)</td><td>Understand</td><td>BTL2</td></tr>
<tr><td>7</td><td>(i)Solve the given regular expression (a/b)* abb (a/b)* into NFA using Thompson construction.
(ii).Compare NFA and DFA.</td><td>(7)
(6)</td><td>Apply</td><td>BTL3</td></tr>
<tr><td>8</td><td>Create DFA the following NFA.
M=({q_0,q_1},{0,1},δ,q_0,{q_1})
Where δ(q_0,0)={q_0,q_1}
δ (q_0,1)={q_1}
δ(q_1,0)=ϕ
δ(q_1,1)={q_0,q_1}</td><td>(13)</td><td>Create</td><td>BTL6</td></tr>
<tr><td>9</td><td>(i) Show how the DFA is directly converted from an augmented regular expression
((ε / a) b *) * .
(ii)Draw NFA for the regular expression ab*/ab</td><td>(7)
(6)</td><td>Apply</td><td>BTL3</td></tr>
<tr><td>10.</td><td>(i)Define the language accepted by FA. Convert the following NFA into DFA.
<table>
<tr><td></td><td>0</td><td>1</td></tr>
<tr><td>→ p</td><td>{p,q}</td><td>{p}</td></tr>
<tr><td>q</td><td>{r}</td><td>{r}</td></tr>
<tr><td>r</td><td>{s}</td><td>ϕ</td></tr>
<tr><td>*s</td><td>{s}</td><td>{s}</td></tr>
</table>
(ii)Draw the DFA for the augmented regular expression (a|b)*# directly using syntax tree.</td><td>(7)
(6)</td><td>Remember</td><td>BTL1</td></tr>
<tr><td>11</td><td>Define Lex and Lex specifications. How lexical analyzer is constructed using lex? Give an example.</td><td>(13)</td><td>Remember</td><td>BTL1</td></tr>
<tr><td>12</td><td>(i)Explain an algorithm for Lex that recognizes the tokens.
(ii) Describe in detail the tool for generating lexical analyzer.</td><td>(7)
(6)</td><td>Evaluate</td><td>BTL5</td></tr>
<tr><td>13</td><td>(i)Analyze the algorithm for minimizing the number of states of a DFA</td><td>(7)</td><td>Analyze</td><td>BTL4</td></tr>
</table>

	(ii) Minimize DFA using Thompson Construction. (a / b) * a (a / b) (a / b)	(6)		
14	**Show** the minimized DFA for the regular expression: (0 + 1) * (0 + 1) 1 0. (a|b)*a(a|b)(a|b)(a|b).	(13)	Apply	BTL3
	PART-C (15- MARK)			
1.	(i) **Create** languages denoted by the following regular expressions a) (a|b)*a(a|b)(a|b) b) a*ba*ba*ba* c) !! (aa|bb)*((ab|ba)(aa|bb)*(ab|ba)(aa|bb)*)* (ii) Write regular definitions for the following languages: a)All strings of lowercase letters that contain the five vowels in order. b)All strings of lowercase letters in which the letters are in ascending lexicographic order. c)Comments, consisting of a string surrounded by / and /, without an intervening */, unless it is inside double-quotes (")	(9) (6)	Create	BTL6
2.	**Find** transition diagrams for the following regular expression and regular definition. • a(a|b)*a • ((ε|a)b*)* • All strings of digits with at most one repeated digit. • All strings of a's and b's that do not contain the substring abb. • All strings of a's and b's that do not contain the subsequence abb.	(15)	Evaluate	BTL5
3.	.(i)**Prove** that the following two regular expressions are equivalent by showing that the minimum state DFA's are same : a) (a / b) * b) (a * / b *) * (ii) Minimize DFA using Thompson Construction (a / b) * a b b (a / b) *	(10) (5)	Analyze	BTL4
4.	**Generalize** and give an example one regular expression if we were to revise the definition of a DFA to allow zero or one transition out of each state on each input symbol. Some regular expressions would then have smaller DFA's than they do under the standard definition of a DFA. Give and **generalize** an example of one such regular expression.	(15)	Create	BTL6
	UNIT II SYNTAX ANALYSIS			
Role of Parser – Grammars – Error Handling – Context-free grammars – Writing a grammar – Top Down Parsing - General Strategies Recursive Descent Parser Predictive Parser-LL(1) Parser-Shift Reduce Parser-LR Parser- LR (0)Item Construction of SLR Parsing Table - Introduction to LALR Parser - Error Handling and Recovery in Syntax Analyzer-YACC.				

PART-A (2 - MARKS)			
Q.No	**QUESTIONS**	**BT Level**	**Competence**
1.	**Write** the rule to eliminate left recursion in a grammar. Prepare and Eliminate the left recursion for the grammar. S → Aa | b A →Ac | Sd |ε	Create	BTL6
2.	**Define** handle pruning.	Remember	BTL1
3.	**Solve** FIRST and FOLLOW by use the LL(1) grammar.	Apply	BTL3
4.	**List** the concepts of Predictive parsing and shift reduce parsing.	Remember	BTL1
5.	**Differentiate** Top Down parsing and Bottom Up parsing.	Understand	BTL2
6.	**Define** Recursive Descent Parsing.	Remember	BTL1
7.	**List out** the properties of parse tree.	Remember	BTL1
8.	**Compare** and contrast top down parsing with bottom up parsing techniques.	Analyze	BTL4
9.	**Solve** the following grammar is ambiguous: S→aSbS / bSaS / €	Apply	BTL3
10.	**Define** kernel and non-kernel items.	Remember	BTL1
11.	**Difference** between ambiguous and unambiguous grammar.	Analyze	BTL4
12.	**Define** parser. Give the advantages and disadvantages of LR parsing.	Evaluate	BTL5
13.	**Define** Phrase level error recovery.	Remember	BTL1
14.	**Evaluate** the conflicts encountered while parsing.	Evaluate	BTL5
15.	**Analyze** the categories of shift reduce parsing.	Analyze	BTL4
16.	**How** to create an input and output translator with YACC?	Create	BTL6
17.	**Summarize** the Error recovery scheme in yacc.	Understand	BTL2
18.	**What** is the main idea of Left factoring? **Give** an example.	Understand	BTL2
19.	**Discuss** when Dangling reference occur?	Understand	BTL2
20.	**Examine** the approach would you use in Panic mode error recovery.	Apply	BTL3
PART-B (13- MARKS)			
1.	(i)**Explain** left recursion and Left Factoring. (7) (ii)Eliminate left recursion and left factoring for the following grammar. (6) E → E + T | E - T | T T → a | b | (E).	Analyze	BTL-4
2.	(i)What is an ambiguous and un ambiguous grammar? (5) Identify the following grammar is ambiguous or not. E→E+E | E*E | (E)|-E |id for the sentence id+id*id (ii) **Prepare** the following grammar is LL(1) but not SLR(1). S→AaAb | BbBa A→€ (8) B→€	Create	BTL6
3.	(i)**Illustrate** the predictive parser for the following grammar. (8) S→ (L) | a	Apply	BTL3

	L→ L, S | S (ii)Analyze , Is it possible, by modifying the grammar in any way to construct predictive parser for the language of S→ SS + | SS * | a string "aa+ a *.	(5)		
4.	(i)**Evaluate** predictive parsing table and parse the string id+id*id. And find FIRST and FOLLOW. E→E+T | T T→T*F | F F→(E) | id	(7)	Evaluate	BTL5
	(ii)Construct Stack implementation of shift reduce parsing for the grammar E->E+E E->E*E E->(E) E->id and the input string id1+id2*id3	(6)		
5.	(i).**Describe** on detail about the role of parser. (ii)Discuss about the context-free grammar.	(7) (6)	Remember	BTL1
6.	(i).**What** are the different kinds of syntax error phased by a program? Explain in detail. (ii).What are the Error recovery techniques used in Predictive parsing? Explain in detail.	(7) (6)	Remember	BTL1
7.	**Give** the predictive parser for the following grammar. S→ (L) | a L→ L, S | S i.Give a rightmost derivation for (a, (a, a)) and show the handle of each right-sentential form. ii.Show the steps of a shift reduce parser.	(5) (8)	Understand	BTL2
8.	**Analyze** the following grammar is a LR(1) grammar and construct LALR parsing table. S → Aa | bAc | dC | bda A→ d. Parse the input string bdc using the table generated.	(13)	Analyze	BTL4
9.	(i)**Define** YACC parser generator. List out the Error recovery actions in YACC. (ii)List out different error recovery strategies. Explain them.	(8) (5)	Remember	BTL1
10.	(i)**Show** SLR parsing table for the following grammar S → Aa | bAc | Bc | bBa A → d B → d And parse the sentence "bdc" and "dd". (ii)Construct a parse tree for the input string w-cad using top down	(8)	Apply	BTL-3

	parser . S->cAd A->ab|a	(5)		
11.	(i)**Define** SLR (1) parser. Describe the Steps for the SLR parser. (ii)**Predict** the following grammar for generate the SLR parsing table. E→E+T | T T→T*F | F F→F*| a| b	(5) (8)	Understand	BTL2
12	(i)**Consider** the following grammar S → AS|b A→SA|a. Construct the SLR parse table for the grammar. **(ii)Show** the actions of the parser for the input string "abab".	(10) (3)	Apply	BTL3
13.	**Give** the LALR for the given grammar. E → E + T | T , T → T * F | F , F → (E) / id and parse the following. (a + b) * c	(13)	Understand	BTL-2
14.	**Examine** the following grammar using canonical parsing table. E → E + T F → (E) E → T F → id. T → T * F T → F	(13)	Remember	BTL-1
	PART-C (15 -MARKS)			
1.	What is an operator grammar? **Draw** the precedence function graph for the following table.	(15)	Create	BTL6
2	**Explain** in detail about the various types of Top –down parsing.	(15)	Evaluate	BTL5

	a	(	)	,	$
a			>	>	>
(	<	<	=	<	
)			>	>	>
,	<	<	>	>	
$	<	<			

3	**Analyze** the LR parsing algorithm with an example (15)	Analyze	BTL4
4	What is CFG .**Explain** in detail about the Context-Free Grammar. (15)	Evaluate	BTL5
	UNIT-III INTERMEDIATE CODE GENERATION		
	Syntax Directed Definitions, Evaluation Orders for Syntax Directed Definitions, Intermediate Languages: Syntax Tree, Three Address Code, Types and Declarations, Translation of Expressions, Type Checking.		
	PART-A (2 - MARKS)		
1.	**List** out the two rules for type checking.	Remember	BTL1
2.	**Compare** synthesized attributes and inherited attributes.	Analyze	BTL4
3.	What is Annotated parse tree?	Remember	BTL1
4.	**Define** Type checker.	Remember	BTL1
5.	What is a syntax tree? Draw the syntax tree for the assignment statement a := b * -c + b * -c	Create	BTL6
6.	**Define** type systems.	Remember	BTL1
7.	**Express** the rule for checking the type of a function.	Understand	BTL2
8.	**Define** Syntax directed definition of a simple desk calculator.	Remember	BTL1
9.	**Summarize** about the S-attributed definition?	Evaluate	BTL5
10.	**Give** the difference between syntax-directed definitions and translation schemes.	Understand	BTL2
11.	**State** the type expressions.	Remember	BTL1
12.	**Illustrate** the methods of implementing three-address statements.	Apply	BTL3
13.	**Differentiate** S-attribute and L-attribute definitions.	Analyze	BTL4
14.	**Create** the target machine instructions to implement the call statement in static allocation.	Create	BTL6
15.	**Translate** the conditional statement if a<b then 1 else 0 into three address code.	Understand	BTL2
16.	**Tes**t whether the following rules are L-attribute or not? Semantic rules A.s = B.b; B.i = f(C.c,A.s)	Evaluate	BTL5
17.	What are the methods of representing a syntax tree?	Understand	BTL2
18.	**Explain** the syntax directed definition for if-else statement	Analyze	BTL4
19.	**Examine the** usage of syntax directed definition	Apply	BTL3
20.	**Discuss** the three address code sequence for the assignment statement. d=(a-b)+(a-c)+(a-c)	Understand	BTL2
	PART-B (13- MARKS)		
1.	**Discuss** the following in detail about the Syntax Directed Definitions. (i)Inherited Atrributes and Synthesized attributes. (7) (ii) Evaluate SDD of a parse tree. (6)	Understand	BTL2
2.	**Evaluate** the expressions for the SDD annotated parse tree for the following expressions. (i)3 * 5 + 4n (7)	Evaluate	BTL5

	(ii)1* 2*3*(4+5) (6)		
3.	Suppose that we have a production A→BCD. Each of the four non terminal A, B, C and D have two attributes: S is a synthesized attribute and i is an inherited attribute. **Analyze** For each of the sets of rules below tell whether (i)the rules are consistent with an S-attributed definition(ii) the rules are consistent with an L-attributed definition and(iii) whether the rules are consistent with any evaluation order at all? a) A.s = B.i + C.s b) A.s = B.i + C.s and D.i = A.i + B.s. (13)	Analyze	BTL4
4.	**Apply** the S-attributed definition and constructs syntax trees for a simple expression grammar involving only the binary operators + and -. As usual, these operators are at the same precedence level and are jointly left associative. All nonterminal have one synthesized attribute node, which represents a node of the syntax tree. Production:L->E$ E→E_1+T,E →T, T->T1*F,T→ (E),T→ digit. (13)	Apply	BTL3
5.	**Discuss** in detail about (i)Dependency graph (10) (ii)Ordering Evaluation of Attributes. (3)	Understand	BTL2
6.	**Create** variants of Syntax tree. Explain in detail about it with suitable examples. (13)	Create	BTL6
7.	(i).Analyse the common three address instruction forms. (7) (ii). Explain the two ways of assigning labels to the following three address statements (6) Do i=i+1; While (a[i]<v);	Analyze	BTL4
8.	**Describe**.in detail about (i) Quadruples (7) (ii) Triples. (6)	Remember	BTL1
9.	(i) **Describe** in detail about addressing array Elements. (6) (ii) Discuss in detail about Translation of array reference. (7)	Remember	BTL1
10.	**Describe** in detail about types and declaration with suitable examples. (13)	Remember	BTL1
11.	**Compare** three address code for expression with the Incremental translation. (13)	Analyze	BTL-4

12.	**Show** the intermediate code for the following code segment along with the required syntax directed translation scheme (13)
	while (i < 10)
	if (i % 2 == 0)
	evensum = evensum + i
	else
		Understand	BTL-2

	oddsum = oddsum + i		
13.	(i)**State** the rules for type checking with example. (7) (ii) Give an algorithm for type inference and polymorphic function. (6)	Remember	BTL-1
14.	**Illustrate** an algorithm for unification with its operation. (13)	Apply	BTL-3
	PART-C(15 -MARKS)		
1.	**Create** the following uind the arithmetic expression a+- (b+c)* into (i)Syntax tree (ii)Quadruples (iii)Triples (iv)Indirect Triples (15)	Create	BTL-6
2.	**Explain** the steps for constructing a DAG. Construct the DAG for the following expression ((x+y)-((x+y)*(x-y)))+((x+y)*(x-y)) (15)	Evaluate	BTL5

3.	**Generate** an intermediate code for the following code segment with the required syntax-directed translation scheme.
	if (a > b)
	x = a + b
	else
	x = a - b (15)
		Create	BTL-6

4.	What is Type conversion? What are the two types of type conversion? **Evaluate** the rules for the type conversion. (15)	Evaluate	BTL5
	UNIT IV- RUN-TIME ENVIRONMENT AND CODE GENERATION		
	Storage Organization, Stack Allocation Space, Access to Non-local Data on the Stack, Heap Management - Issues in Code Generation - Design of a simple Code Generator.		
	PART-A (2 -MARKS)		
1.	**List** out limitations of the static memory allocation.	Remember	BTL1
2.	**How** the storage organization for the run-time memory is organized?	Apply	BTL3
3.	What is heap allocation?	Remember	BTL1
4.	**How** the activation record is pushed onto the stack?	Apply	BTL3
5.	**Analyze** the storage allocation strategies.	Analyze	BTL4
6.	**State** the principles for designing calling sequences.	Remember	BTL1
7.	**List out** the dynamic storage techniques.	Remember	BTL1
8.	**Define** the non-local data on stack.	Remember	BTL1
9.	**Define** variable data length on the stack.	Remember	BTL1
10.	**Differentiate** between stack and Heap allocation	Analyze	BTL4
11.	**Distinguish** between static and dynamic storage allocation.	Understand	BTL2
12.	**Discuss** the main idea of Activation tree.	Understand	BTL2
13.	**Give** the fields in an Activation record.	Understand	BTL2
14.	**Compose** space efficiency and program efficiency.	Create	BTL6
15.	**Construct** typical memory hierarchy configuration of a computer.	Evaluate	BTL5
16.	**How** would you solve the issues in the design of code generators?	Apply	BTL3

17.	**Evaluate** Best-fit and Next-fit object placement.	Evaluate	BTL5
18.	**Prepare** optimal code sequence for the given sequence t=a+b t=t*c t=t/d	Create	BTL6
19.	**Analyz**e the different forms of machine instructions.	Analyze	BTL4
20.	**Discuss** the four principle uses of registers in code generation.	Understand	BTL2
	PART-B (13- MARKS)		
1.	(i)**Illustrate** the storage organization memory in the perspective of compiler writer with neat diagram. (8) (ii)Compare static versus dynamic memory allocation. (5)	Apply	BTL3
2.	**Explain** in detail about the various issues in code generation with examples. (13)	Evaluate	BTL5
3.	(i)**Develop** a quicksort algorithm for reads nine integers into an array a and sorts them by using the concepts of activation tree. (9) (ii)Give the structure of the action record. (4)	Create	BTL6
4.	**How** to a design a call sequences and analyze the principles of activation records with an example. (13)	Analyze	BTL4
5.	**Discuss** in detail about the activation tree and activation record with suitable example (13)	Understand	BTL 2
6.	(i) **Analyze** the data access without nested procedure and the issues with nested procedure. (7) (ii)Give the version of quicksort in ML style using nested procedure. (6)	Analyze	BTL4
7.	(i)**Discuss** in detail about heap manager. (7) (ii)Describe in detail about the memory hierarchy of a computer (6)	Understand	BTL2
8.	Define fragmentation? **Describe** in detail about how to reduce the fragment. (13)	Remember	BTL1
9.	**Write** short notes on the following i. Best fit and next object placement. (7) ii. Managing and coalescing free space (6)	Remember	BTL1
10.	**Examin**e the problems with manual deallocation of memory and explain how the conventional tools are used to cope with the complexity in managing memory. (13)	Remember	BTL1
11.	**Explain** in detail about instruction selection and register allocation of code generation. (13)	Analyze	BTL4
12.	**Illustrate** in detail about the code generation algorithm with an example. (13)	Apply	BTL-3
13.	**Describe** the usage of stack in the memory allocation and **discuss** in detail about stack allocation space of memory. (13)	Understand	BTL-2
14.	Define the heap management of memory and **describe** in detail about it . (13)	Remember	BTL-1
	PART-C (15-MARKS)		
1.	Suppose the heap consists of seven chunks, starting at address 0. The sizes of the chunks, in order, are 80, 30, 60, 50, 70, 20, 40 (15)	Evaluate	BTL-5

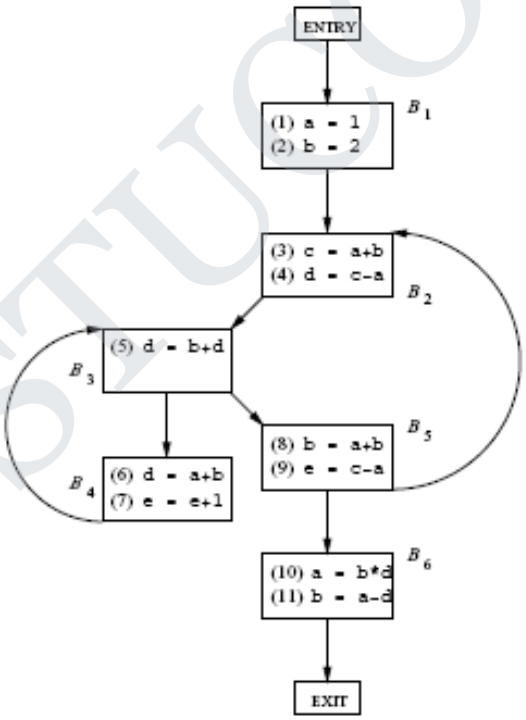
	bytes. When we place an object in a chunk, we put it at the high end if there is enough space remaining to form a smaller chunk (so that the smaller chunk can easily remain on the linked list of free space). However, we cannot tolerate chunks of fewer that 8 bytes, so if an object is almost as large as the selected chunk, we give it the entire chunk and place the object at the low end of the chunk. If we request space for objects of the following sizes: 32, 64, 48, 16, in that order, what does the free space list look like after satisfying the requests, if the method of selecting chunks is a) First fit. b) Best fit.		
2.	**Compare** the stack and heap allocation memory in detail with suitable examples. (15)	Analyze	BTL4
3.	**Generate** code for the following sequence assuming that **n** is in a memory location (15) s=0 i=0 L1 : if I > n goto L2 s=s+i i=i+1 goto L1 L2 :	Create	BTL-6
4.	**Create** following assignment statement into three address code (15) D:=(a-b)*(a-c)+(a-c) Apply code generation algorithm to generate a code sequence for the three address statement. (13)	Create	BTL-6
UNIT V- CODE OPTIMIZATION			
Principal Sources of Optimization – Peep-hole optimization - DAG- Optimization of Basic Blocks Global Data Flow Analysis - Efficient Data Flow Algorithm.			
PART-A (2 -MARKS)			
1.	**List** out the examples of function preserving transformations.	Remember	BTL1
2.	**Illustrate** the concepts of copy propagation.	Apply	BTL3
3.	**State** the use of machine Idioms.	Remember	BTL1
4.	**Show** the flow graph for the quicksort algorithm	Apply	BTL3
5.	**Apply** the basic block concepts, how would you representing the dummy blocks with no statements indicated in global dataflow analysis?	Apply	BTL3
6.	**Identify** the constructs for optimization in basic block.	Remember	BTL1
7.	**List** out the properties of optimizing compilers.	Remember	BTL1
8.	**Define** the term data flow analysis.	Remember	BTL1
9.	How is liveness of a variable calculated? **Identify** it.	Remember	BTL1
10.	What is DAG? **Point out** advantages of DAG.	Analyze	BTL4
11.	**Give** the uses of gen and Kill functions	Understand	BTL2
12.	**Discuss** the concepts of basic blocks and flow graphs.	Understand	BTL2
13.	**Give** the main idea of dead code elimination and constant folding.	Understand	BTL2
14.	**Prepare** the three address code sequence for the assignment statement.	Create	BTL6

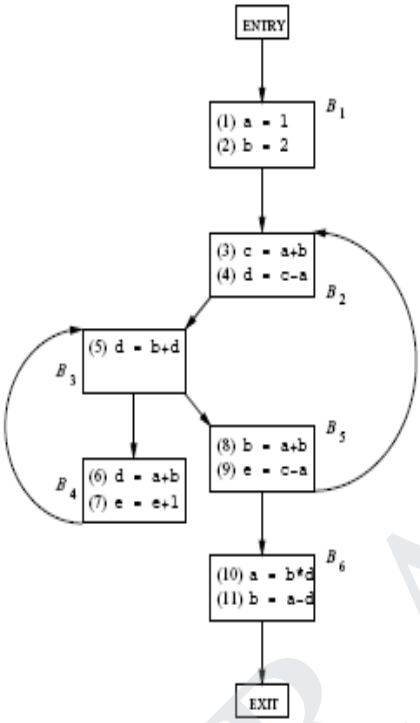
	d:= (a- b) + (a-c) + (a-c).		
15.	Construct and **explain** the DAG for the follow basic block. d:= b * c e:= a+ b b:= b*c a:= e-d.	Evaluate	BTL5
16.	What role does the target machine play on the code generation phase of the compiler? **Analyze** it.	Analyze	BTL4
17.	Draw the DAG for the statement a= (a*b+c) – (a*b+c) and **evaluate** it.	Evaluate	BTL5
18.	**Develop** the code for the follow C statement assuming three registers are available. x = a / (b + c) – d * (e + f)	Create	BTL6
19.	**Point out** the characteristics of peephole optimization.	Analyze	BTL4
20.	**Define** algebraic transformations. Give an example	Understand	BTL2
	PART-B(13 MARKS)		
1.	**Explain** briefly about the principal sources of optimization. (13)	Evaluate	BTL5
2.	(i).**Explain** in detail about optimization of basic blocks. (5) (ii).Construct the DAG for the following Basic block & **explain** it. (8) 1. t1: = 4 * i 2. t2:= a [t1] 3. t3: = 4 * i 4. t4:= b [t3] 5. t5:=t2*t4 6. t6:=Prod+t5 7. Prod:=t6 8. t7:=i+1 9. i:= t7 **10.** if i<= 20 goto (1).	Analyze	BTL4
3.	**Discuss** the following in detail (i)Semantic preserving transformation (7) (ii)Global Common subexpression (6)	Understand	BTL2
4.	**Write** about the following in detail (5) (i)copy propagation (5) (ii)Dead code Elimination (3) (iii)code motion	Remember	BTL1
5.	**Explain** in detail about the data-flow schemas on basic block and the transfer equations for reaching definitions with example (13)	Analyze	BTL4
6.	(i) Illustrate the Iterative algorithm for reaching definitions (7) (ii)Discuss the live variable analysis (6)	Apply	BTL3
7.	**Analyze** Peephole optimization with suitable examples. (13)	Analyze	BTL4
8.	**Demonstrate** optimization of Basic Blocks with an example. (13)	Apply	BTL3
9.	(i)**Discuss** in detail about how to find Local Common Sub expressions. (8) (ii)**Discuss** in detail about the Use of Algebraic Identities. (5)	Understand	BTL2

10.	**Describe** in detail about the flow of control optimization. (7) Identify the methods to eliminate the unreachable code, load and store data. (6)	Remember	BTL1
11.	(i)Give an example to identify the dead code in the DAG. (5) (ii)**Describe** the representation of array using DAG with example. (8)	Remember	BTL1
12.	**Summarize** in detail about the dataflow analysis of available expression with suitable example. (13)	Understand	BTL2
13.	(i)**Formulate** steps to identify the loops in the basic block. (7) (ii) Describe about induction variable and end reduction in strength (6)	Create	BTL6
14.	**Describe** the efficient data flow algorithms in detail. (13)	Remember	BTL1
	PART-C(15 MARKS)		

1.	**Create** DAG and three – address code for the following C program. (15)
	i = 1; s = 0;
	while (i<= 10)
	{
	s = s+ a[i] [i];
	i = i + 1;
	} (15)
		Create	BTL6

2.	Identify the loops of the flow graph, Identify the global common sub expression for each loop, Identify Induction variables for each loop and Identify loop invariant computation for each loop from the given diagram, (15)	Create	BTL6
3.	Compute the grn and Kill sets for each Block, In and Out sets for each block, Compute e_gen and e_kill from the given diagram. (15)	Evaluate	BTL5



			
4.	**Analyze** the available expressions on the following code by converting into basic blocks and compute global common sub – expression elimination. (15) i = 0 a:= n-3 if i < a then loop else end label loop b:= i -4 c:= p + b d:= M[c] e:=d-2 f:=i-4 g:=p+f m[g]:=e i:=i+1 a:=n-3 if i < a then loop else end label end	Analyze	BTL4