Name: Printed Pages:

Student University Roll No.:

School of Engineering

Second Sessional Examination, Even Semester (AS: 2023-24)

B. Tech: CSE/AI/CCML [Year: III] [Semester: VI]

Course Title: Compiler Design | **Max Marks: 60**

Course Code: BCS3604 | **Time: 3hrs**

Read the questions Carefully.

	SECTION 'A' **Q.N.1. Attempt all parts of the following:**	**Course Objective**	**Marks**
a)	Identify the lexemes and their corresponding tokens in the following statement: printf ("Simple Interest=%f\n", si);	CO1	1
b)	Explain any three tools that help a programmer in building a compiler efficiently.	CO1	1
c)	Write regular expressions for the following languages: All strings of a's and b's that do not contain the subsequence abb.	CO1	1
d)	Elaborate the various fields in an activation record.	CO2	1
e)	Consider the context free grammar S->aSbS | bSaS | ∈ Check whether the grammar is ambiguous or not	CO1	1
f)	Apply bootstrapping to develop a compiler for a new high level language P on machine N.	CO1	1
g)	Define cross-compilers.	CO1	1
h)	Explain any two issues in the design of a code generator.	CO3	1

	SECTION 'B' **Q.N.2. Attempt any two parts of the following:**	**Course Objective**	**Marks**
a)	Design a recursive descent parser for the grammar E->E + T | T T->T*F | F F->(E) | id	CO1	6
b)	Derive LALR (1) parsing algorithm for following grammar S→AS/b A→SA/a	CO	6
c)	Construct DAG for the expression (a/10 + (b -10))*(a/10 + (b-10)). Also write the sequence of instructions used for the DAG construction.	CO1	6
d)	Construct canonical LR(0) collection of items for the grammar below. S → L = R S → R L → * R L → id R → L Also identify a shift reduce conflict in the LR(0) collection constructed above.	CO1	6

	SECTION 'C' **Q.N.3. Attempt any two parts of the following:**	**Course Objective**	**Marks**
a)	Define S-attributed and L-attributed definitions. Give an example each.	CO2	5
b)	Generate a code sequence for the assignment d=(a-b)+(a-c)+(a-c)	CO3	5
c)	Find the FIRST and FOLLOW of the non-terminals in the grammar S->aABe A->Abc|b B->d	CO2	5

Q.N.4. Attempt any two parts of the following:

a)	Construct SLR parsing table for the grammar A ->a | (A).	CO2	5
b)	What is static allocation strategy? What are its limitations?	CO2	5
c)	Trace the output after each phase of the compiler for the assignment statement: a = b + c * 10, if variables given are of float type.	CO1	5

Q.N.5. Attempt any two parts of the following:			
a)	What is handle pruning? Indicate the handles in the reduction of the right sentential form S S+ a * to the start symbol using the grammar below: S -> S S+ | S S * | a	CO 2	5
b)	With an example each explain the following loop optimization techniques: (i)Code motion (ii) Loop unrolling and (iii) strength reduction	CO4	5
c)	Draw the DFA for the regular expression (a | b)* (abb | a+ b).	CO1	5
Q.N.6. Attempt any two parts of the following:			
a)	Write the algorithm for partitioning a sequence of three-address instructions into basic blocks.	CO4	5
b)	Explain the role of symbol table, symbol table management in compiler design.	CO2	5
c)	Differentiate between Parse tree and Syntax tree with the use of suitable example.	CO3	5

Table 1: Mapping between COs and questions
(Number of COs may vary from course to course)

COs	Questions Numbers	Total Marks
CO1	Q1a),b),c),e),f),g), Q2a),b),d), Q4c), Q5c)	34
CO2	Q1d), Q3a),c), Q4a),b), Q5a), Q6b)	31
CO3	Q1h), Q3b), Q6c)	11
CO4	Q2c), Q5b), Q6a)	16

for