Semester: VI
Subject Name:- CD.& Code:-CS 3008
Branch (s): - CSE

SPRING MID SEMESTER EXAMINATION-2024

School of Computer Engineering
Kalinga Institute of Industrial Technology, Deemed to be University
Compiler Design
[CS 3008]

Time: 1 1/2 Hours **Full Mark: 20**

Answer Any four questions including question No.1 which is compulsory.
The figures in the margin indicate full marks. Candidates are required to give their answers in their own words as far as practicable and all parts of a question should be answered at one place only.

1. Answer all the questions. [1 Mark × 5]

   a) Generate an expression tree for the statement: **s = (a * (a+b)) ^ c—d**. You may consider precedence of each operator as per the conventional mathematical principle.

   b) Design a Finite Automaton for the regular expression : **(a+b)*a*b**.

   c) Design a context free grammar in such a manner that it generates expression tree where the precedence of + is greater than that of *, considering it contains only two operators and terminal symbol **id**.

   d) What are the advantages of interpreter over compiler?

   e) Identify different tokens in the following C expression:
   /* Statement */ printf("This is equal to", ++&&**a);

2. Show the output of each phase of compiler for the expression **i = i * 70 + j + 2** with a neat diagram. Consider the variables i and j are of **float** type & occupies 6 bytes of memory each. [5 Marks]

3. Consider the following grammar G:

$$E \rightarrow E+E \mid E-E \mid T$$

$$T \rightarrow id \mid id[\,] \mid id[X]$$

$$X \rightarrow E, E \mid E$$

Write an unambiguous grammar G1, so that L(G1) = L(G). Then eliminate left recursion from the grammar G1 to construct a grammar G2, so that L(G2) = L(G1). Finally perform left factoring on G2 to construct G3, so that L(G3) = L(G2). [5 Marks]

4. Consider the following grammar:

$$E \rightarrow T\ X$$

$$X \rightarrow +\ E \mid \varepsilon$$

$$T \rightarrow (\ E\ ) \mid \text{int}\ Y$$

$$Y \rightarrow *\ T \mid \varepsilon$$

Find FIRST & FOLLOW for each non-terminal. Create a LL(1) parse table for the above grammar. Use the parse table to parse the given string: **int*(int) + int.** [5 Marks]

5. Write down the procedure for the recursive descent parser for the following grammar:

$$E \rightarrow 0E*A \mid E+A \mid E\ \%\ 0$$

$$A \rightarrow 1A01 \mid 1$$ [5 Marks]

*** Best of Luck ***