

GRAPHIC ERA HILL UNIVERSITY, DEHRADUN

SEMESTER VI

Name of Department: - Computer Science and Engineering

1. Subject Code: **PCS-601** Course Title: **Compiler Design Lab**
2. Contact Hours: L: **0** T: **0** P: **4**
3. Examination Duration (Hrs): Theory: **0** Practical: **3**
4. Relative Weight: CIE: **25** MSE: **25** SEE: **50**
5. Credits: **2**
6. Semester: **6**
7. Category of Course: **DC**
8. Pre-requisite: **TCS-402, PCS-251**

9. Course Outcome**:	<p>After completion of the course the students will be able to:</p> <p>CO1: Construct lexical analyzer and parser layout by using modern tools like Flex and Bison.</p> <p>CO2: Explore the different finite automata problems with the help of tools.</p> <p>CO3: Compare and contrast various parsing techniques such as SLR, CLR, LALR with the help of bison tool.</p> <p>CO4: Analyze the syntax rules by designing the syntax trees from different aspects of programming languages.</p>
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*** Describe the specific knowledge, skills, or competencies the students are expected to acquire or demonstrate.*

10. Details of the Course:

Sr. No	List of problems for which student should develop program and execute in the Laboratory	Contact Hrs
1	<p>Study about Lex and Yacc tools.</p> <p>Hint: In this, students need to write the explanation about the structure of lex, structure of lex program and structure of yacc as well. Moreover, they also required the explanation about the pre-defined patterns in the form of regular expressions and set of auxiliary functions.</p>	2
2	<p>Design a LEX Code to count the number of lines, space, tab-meta character, and rest of characters in given Input pattern.</p> <p>Sample Input:</p> <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p>Hello and Welcome to Compiler Design Lab</p> </div>	2

	<p>Sample Output:</p> <div> The number of lines are: 2 The number of spaces are: 3 The number of tab-meta characters are: 2 The rest of the characters are: 34 </div>	
3	<p>Design a LEX Code to identify and print valid Identifier of C in given Input pattern.</p> <p>Sample Input:</p> <div> 1) Enter any identifier you want to check: abc 2) Enter any identifier you want to check: abc123 3) Enter any identifier you want to check: abc_12 4) Enter any identifier you want to check: _abc12 5) Enter any identifier you want to check: 12abc 6) Enter any identifier you want to check: ab@c </div> <p>Sample Output:</p> <div> 1) This is a Valid Identifier 2) This is a Valid Identifier 3) This is a Valid Identifier 4) This is a Valid Identifier 5) This is not a Valid Identifier 6) This is not a Valid Identifier </div>	2
4	<p>Design a LEX Code to identify and print integer and float value in given Input pattern.</p> <p>Sample Input:</p> <div> 1) Enter any number you want to check: 10 2) Enter any number you want to check: 1.5 3) Enter any number you want to check: abc </div> <p>Sample Output:</p> <div> 1) This is an Integer Number 2) This is a Floating Point Number 3) This is not a Valid Number </div>	2
5	<p>Design a LEX Code for Tokenizing (Identify and print OPERATORS, SEPERATORS, KEYWORDS, and IDENTIFIERS) in the given input:</p> <p>Sample Input:</p> <div> Write Your C Program for Tokenizing: int a, b = 10; </div> <p>Sample Output:</p> <div> int is a keyword. a is an identifier. , is a separator. b is an identifier. = is an operator. 10 is a constant. ; is a separator. </div>	2

6	<p>Design a LEX Code to count and print the number of total characters, words, and white spaces in given 'Input.txt' file.</p> <p>Sample Input.txt file:</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;">Hello and Welcome to the CD Lab</div> <p>Sample Output:</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>The number of total characters in the given input file is: 31</p> <p>The number of total words in the given input file is: 7</p> <p>The number of total white spaces in the given input file is: 6</p> </div>	2
7	<p>Design a LEX Code to replace white spaces of 'Input.txt' file by a single blank character into 'Output.txt' file.</p> <p>Sample Input.txt:</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> Lex is a program that generates lexical analyzer. It is used with YACC parser generator. The lexical analyzer is a program that transforms an input stream into a sequence of tokens. </div> <p>Sample Output.txt:</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> Lex is a program that generates lexical analyzer. It is used with YACC parser generator. The lexical analyzer is a program that transforms an input stream into a sequence of tokens. </div>	2
8	<p>Design a LEX Code to remove the comments from any C Program given at run-time and store into 'out.c' file.</p> <p>Sample Input:</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> int a = 10; int b = 20; // int sum = a + b; printf("%d", sum); </div> <p>Sample Output:</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> int a = 10; int b = 20; printf("%d", sum); </div>	2
9	<p>Design a LEX Code to extract all html tags in the given HTML file at run time and store into Text file given at run time.</p>	2
10	<p>Design a LEX Code to recognize and print the following tokens:</p> <ul style="list-style-type: none"> a) string b) keywords c) constants d) identifiers e) literals 	2

11	<p>Design a LEX Code to take check whether the given number is even or odd.</p> <p>Sample Input:</p> <div>Enter a string: 25 Enter a string: 54 Enter a string: 25ab</div> <p>Sample Output:</p> <div>25 is an odd number. 54 is an even number. 25ab is not a valid number.</div>	2
12	<p>Design a LEX Code to count number of vowels and consonants in a given pattern.</p> <p>Sample Input:</p> <div>Enter a string: This is a LEX Code</div> <p>Sample Output:</p> <div>Total number of Vowels are: 6 Total number of Consonants are: 8</div>	2
13	<p>Design a LEX Code to check for a valid E-mail Id.</p> <p>Sample Input:</p> <div>Enter a string: abc123@gmail.com Enter a string: abc123.ss@gmail.com Enter a string: abc123#ss@gmail.com</div> <p>Sample Output:</p> <div>abc123@gmail.com is a valid email. abc123.ss@gmail.com is a valid email. abc123#ss@gmail.com is not a valid email.</div>	2
14	<p>Design a DFA in LEX Code which accepts all possible set of string containing even number of 'a' and even number of 'b' over input alphabet $\Sigma = \{a, b\}$. Hint: Construct an appropriate DFA for the given problem then write the lex program accordingly.</p> <p>Sample Input:</p> <div>Enter a string: ε Enter a string: ab Enter a string: aa Enter a string: bb Enter a string: aabb</div> <p>Sample Output:</p> <div>ε is accepted. ab not accepted aa is accepted. bb is accepted. aabb is accepted.</div>	2
15	<p>Design a DFA in LEX Code to Identify and print Integer, Float Constants and Identifier.</p> <p>Hint: Construct an appropriate DFA for the given problem then write the lex program accordingly.</p>	2

16	Design a DFA in LEX Code over $\Sigma = \{a, b\}$ which contains set of all possible strings where every string starts with a and ends with b. Hint: Construct an appropriate DFA for the given problem then write the lex program accordingly.	2
17	Design YACC / LEX code to recognize valid arithmetic expression with operators +, -, * and /	2
18	Design YACC / LEX code to evaluate arithmetic expression involving operators +, -, * and / without operator precedence grammar and with operator precedence grammar.	2
19	Design YACC / LEX code that translates INFIX Expression to POSTFIX Expression.	2
20	Design a Desk Calculator using YACC / LEX code.	2

11. **Suggested Books:**

Sr. No	Name of Authors/Books/Publishers	Edition	Year of Publication Reprint
Textbooks			
1	Charles N. Fischer, Richard J. leBlanc, Jr.: "Crafting a Compiler with C", Pearson Education, 1991.	2 nd	2012
2	Andrew W Apple: "Modern Compiler Implementation in C", Cambridge University Press, 1997.	2 nd	2012
3	Kenneth C Loudon: "Compiler Construction Principles & Practice", Thomson Education, 1997.	6 th	2011
Reference Books			
1	Alfred V Aho, Ravi Sethi, Jeffrey D Ullman: "Compilers- Principles, Techniques and Tools", Pearson Education, 2007	5 th	2014

12.	Mode of Evaluation:	Test / Quiz / Assignment / Mid Term Exam / End Term Exam
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