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Enrolment No:			
<div>UPES</div> <div>End Semester Examination, May 2025</div> <div><div>Course: Compiler Design</div><div>Program: B.Tech- CSE (All Specializations)</div><div>Course Code: CSEG 3015</div></div> <div><div>Semester : VI</div><div>Time : 03 hrs.</div><div>Max. Marks: 100</div></div>			
Instructions: Attempt all the questions.			
SECTION A (5Qx4M=20Marks)			
S. No.	Problem Statement	Marks	CO
Q 1	Consider a string $s = \textit{welcome}$. Write down the prefix(s), proper prefix(s), suffix(s), and proper suffix(s).	4	CO1
Q 2	Differentiate between the regular grammar and regular expression using suitable examples.	4	CO2
Q 3	Write down the syntax for all sections in YACC specification.	4	CO2
Q 4	Construct the DAG for the following expressions: <i>i. $a + a + ((a + a + a + (a + a + a + a))$</i> <i>ii. $x + y + x + y + x + y + x + y$</i> <i>iii. $((x + y) - ((x + y) * (x - y))) + ((x + y) * (x - y))$</i> <i>iv. $y = x[i] + z[i]$</i>	4	CO3
Q 5	Convert the following C-code snippet into quadruple representation. <i>sum = 0;</i> <i>requiredIncome = 200,000;</i> <i>monthlyIncome = 2000;</i> <i>noOfMonths = 0;</i> <i>while (sum <= requiredIncome)</i> <i>{</i> <i> sum = sum + monthlyIncome;</i> <i> noOfMonths = noOfMonths + 1;</i> <i>}</i> <i>check = requiredIncome == sum;</i>	4	CO5
SECTION B (4Qx10M= 40 Marks)			
Q 6	<i>i. Explain L-attributed SDD using a suitable example.</i> <i>ii. Write a S-attributed SDD to compute the value of an arithmetic expression like $id + id * id$.</i> <i>iii. Using the SDD devised in (ii), draw an annotated tree for</i>	3 + 4 + 3	CO4

	$1*2*3*(4+5).$		
Q 7	<p>Write suitable semantic rules for the following grammar G_1 to produce the three address code. Also, draw the annotated parse for the string, “$id = id + (id * id)$” to verify the functionality of your SDD.</p> <p>G_1:</p> $ \begin{aligned} S &\rightarrow id = E \\ E &\rightarrow E_1 + E_2 \\ &\quad E_1 * E_2 \\ &\quad -E_1 \\ &\quad (E_1) \\ &\quad id \end{aligned} $	5 + 5	CO4
Q 8	<p>Construct a SLR parsing table for the following grammar G_2:</p> <p>G_2:</p> $ \begin{aligned} E &\rightarrow E + T \mid T \\ T &\rightarrow T * F \mid F \\ F &\rightarrow (E) \mid id \end{aligned} $	10	CO3
Q 9	<p>Discuss the role of symbol table in compilers in detail. Also, list various operations that can be implemented in a symbol table.</p> <p style="text-align: center;">OR</p> <p>Classify all possible errors in compiler design. And, discuss available error handling techniques.</p>	10	CO4
SECTION-C (2Qx20M=40 Marks)			
Q 10	<p>Consider the following C-code snippet for bubble sorting.</p> <pre> for (i=0; i<(n-1); i++) { for (j=0; j<n-i-1;j++) { if (array[j] > array[j+1]) { swap= array[j]; array[j]=array[j+1]; array[j+1]=swap; } } } </pre> <p>i. Translate the program into three-address code. Assume integers require 4 bytes.</p> <p>ii. Construct the flow graph for your code from (i).</p> <p>iii. Identify the loops in your flow graph from (ii).</p>	10 + 5 + 5	CO5

Q 11	<p>Write short notes on any five of the followings while providing suitable examples:</p> <ul style="list-style-type: none"> i. FIRST vs. FOLLOW ii. LEADING vs. TRAILING iii. CLOSURE() vs. GOTO() iv. Shift-Reduce vs. Reduce-Reduce conflicts v. Right Most Derivation vs. Left Most Derivation vi. LL(1) vs. LR(1) grammars vii. Parse Tree vs. Syntax Tree 	<p>5 x 4 = 20 Marks</p>	<p>CO3</p>
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