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Daffodil International University

Faculty of Science & Information Technology
Department of Computer Science & Engineering
Final Examination, Spring - 2025
Course Code: CSE331, Course Title: Compiler Design
Level: 4 Term: 1 Batch: 61

Time: 02:00 Hrs. **Marks: 40**

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1. a) Apply left factoring technique in the following grammar. [3]
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b) Consider the following grammar to produce LR (0) parser and Canonical Table from the following grammar. [7]

A → AxyB | xC
B → Cbxy | a
C → CbC | y
D → a | m

2. a) State the rules of the FIRST () and FOLLOW () functions. [3]

b) Construct a predictive parsing table from the following grammar using LL (1) parser. [7]

Productions	FIRST ()	FOLLOW ()
Expense → Tax Salary		
Salary → Grocery Tax Salary | / | ε		
Grocery → + | - | ε		
Tax → Factor Benefit		
Benefit → Cost Factor Benefit | / | ε		
Cost → *		
Factor → (Expense) | num		

3. a) Consider the following expression: [6]

$$x+x*(y-z)+(y-z)*p+q-x+z$$

Write the Three Address code, Quadruples, Indirect Triples and draw the DAG for the above expression.

b) Describe the following Code Optimization techniques with proper example. [4]
i. Copy Propagation and
ii. Strength Reduction

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4.	a)	Consider the following Instructions and answer the following questions: 1. i = a + 5 2. j = b - 3 3. t1 = 2 * i 4. k = t1 + j 5. if i>=j goto (3) 6. v = c[t1] 7. i = i + 1 8. t2 = 3 * i 9. x = y + 4 10. t3 = x * 2 11. z = t3 - j 12. a[t12] = t14 goto (9) 13. q = d[t2] 14. j = j - 1 15. t4 = 5 * j 16. p = r + t4 17. w = e[j] 18. m = p * 3 19. w = e[j] goto (16) 20. a = t5 / 2 21. t5 = 6 * m 22. b = n + t6 23. t6 = t4 + 2 24. y = a + 3 25. j = j – 1 goto (22) 26. goto (6). 27. y = o[t9] 28. z = x - t6 29. n = t3 + t8 30. t8 = 8 * x 31. 32. t9 = 4 * y 33. goto (28). 34. t10 = 9 * z 35. l = m + t10 36. o = q[t8] 37. t8 = 8 * x 38. z = x - t6 39. t2 = 3 * I goto (31) i. Which lines in the code qualify as leaders by leader selection rule 2? ii. Is / Are there any instruction(s) designated as leaders more than twice? iii. What is the total number of basic blocks identified in the code?	[6]	CO3
	b)	Draw the **flow graph** for the above mentioned instructions.	[4]	