

THIRD SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2025
(Regular/Improvement/Supplementary)
COMPUTER SCIENCE
FCSS3C13-PRINCIPLES OF COMPILERS

Time: 3 Hours

Maximum Weightage: 30

Section A: Short answer questions. Answer any *four* questions. Each carries *two* weightage.

1. Explain live variable analysis and its importance.
2. Define Static Single Assignment (SSA) form and explain its advantages.
3. What are the principal sources of optimization?
4. Demonstrate how garbage collection helps in managing heap memory.
5. What is a compiler? Explain the role of a parser.
6. Illustrate how short-circuit evaluation works in boolean expressions.
7. Explain the problem of memory fragmentation in dynamic allocation.

(4 × 2 = 8 weightage)

Section B: Short essay questions. Answer any *four* questions. Each carries *three* weightage.

8. How does a lexical analyzer help in error handling?
9. What is a simple LR parser? Explain.
10. Write the control-flow translation for a while loop using three-address code.
11. Compare static allocation with stack allocation.
12. Describe the characteristics of a simple target machine model.
13. Explain the process of converting an NFA to DFA.
14. Illustrate the process of leftmost and rightmost derivations for the string *ababab* using the grammar $S \rightarrow aSbs / bSaS / \epsilon$. What language does this grammar generate?

(4 × 3 = 12 weightage)

Section C: Essay questions. Answer any *two* questions. Each carries *five* weightage.

15. Explain quadruples, triples, and indirect triples with suitable examples.
16. Design a simple lexical analyzer that can recognize keywords and identifiers from a given code.
17. How basic blocks simplify optimization compared to raw program statements. Explain.
18. Compare operator-precedence parsing and LL (1) parsing techniques.

(2 × 5 = 10 weightage)