

Register No.

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BE Degree Examination May 2022

Sixth Semester

Computer Science and Engineering

18CST61– PRINCIPLES OF COMPILER DESIGN

(Regulations 2018)

Time: Three hours

Maximum: 100 marks

Answer all Questions

Part – A ($10 \times 2 = 20$ marks)

1. Differentiate- a compiler and an interpreter? [CO1,K1]
2. Compare tokens, patterns and lexemes. [CO1,K1]
3. Compute first and follow for the following grammar. [CO2,K3]

$$\begin{array}{ll}
 S \rightarrow aBDh & D \rightarrow EF \\
 B \rightarrow cC & E \rightarrow g/\varepsilon \\
 C \rightarrow bC/\varepsilon & F \rightarrow f/\varepsilon
 \end{array}$$
4. What do you mean by ambiguous grammar? Give an example? [CO2,K1]
5. Identify the different types of intermediate representation? [CO3,K1]
6. Compare synthesized attribute and inherited attribute in Syntax Directed Translation (SDT). [CO3,K2]
7. State the rules for identifying leaders in the basic blocks. [CO4,K1]
8. Construct a DAG for the given basic block [CO4,K3]

$$\begin{array}{l}
 d = b * c \\
 e = a + b \\
 b = b * c \\
 a = e - d
 \end{array}$$
9. Define address and register descriptors. [CO5,K1]
10. What do you mean by activation record? List the fields in that activation record. [CO5,K1]

Part – B ($5 \times 16 = 80$ marks)

11. a. Describe about the various phases of a compiler for the given example, (16) [CO1,K1]
 Pos= Initial + rate*60;
- (OR)
- b. Obtain the minimized DFA for the regular expression $(a|b)^*a(a|b)$ using (16) [CO1,K3]
 subset construction method

12. a. Check whether the following grammar is SLR (1) or not? (16) [CO2,K3]
 $S \rightarrow L=R \mid R$
 $L \rightarrow *R \mid id$
 $R \rightarrow L$
 (OR)
- b. Construct the Predictive parsing table for the grammar (16) [CO2,K3]
 $S \rightarrow (L) \mid a$
 $L \rightarrow L,S \mid S$ and then parse the string (a.a)
13. a. i) Write and explain the syntax directed translation for flow-of control statements (10) [CO3,K3]
 ii) Translate the following code to quadruples: (6) [CO3,K3]
 While $A < C$ and $B < D$ do
 If $A = 1$ then $C = C + 1$
 else while $A \leq D$ do $A = A + 2$
 (OR)
- b. i) List down the common three-address instruction forms? (6) [CO3,K2]
 ii) Describe about the syntax directed translation scheme for Boolean expressions using back patching. (10) [CO3,K2]
14. a. Explain in detail about the principal sources of optimization in compiler with example. (16) [CO4,K1]
 (OR)
- b. i) Describe about Peephole optimization methods. (8) [CO4,K2]
 ii) Discuss about DAG representation of Basic blocks. (8) [CO4,K2]
15. a. Write the code generation algorithm and generate the code sequence for the following statements. (16) [CO5,K3]
 $t = a - b$
 $u = a - c$
 $v = t + u$
 (OR)
- b. Explain about the Heap management in allocation and de allocation of space. (16) [CO5,K2]

| Bloom's Taxonomy Level | Remembering (K1) | Understanding (K2) | Applying (K3) | Analysing (K4) | Evaluating (K5) | Creating (K6) |
|------------------------|------------------|--------------------|---------------|----------------|-----------------|---------------|
| Percentage | 25 | 28 | 47 | - | - | - |