

UNIVERSITY OF PUNE

[4364]-762

B. E. (Computer Engineering)

Examination - 2013

PRINCIPLES OF COMPILER DESIGN (2008 Pattern)

[Total No. of Questions:]

[Total No. of Printed Pages :5]

[Time : 3 Hours]

[Max. Marks : 100]

Instructions :

- (1) Answers to the *two sections* should be written in *separate answer-books*.
 - (2) Neat diagrams must be drawn wherever necessary.
 - (3) Assume suitable data, if necessary.
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SECTION-I

- Q1 a) Discuss the action taken by every phase of compiler on following string: $A = B * C + D / E$ [6]
- b) Construct Predictive Parser for following grammar. [8]
- $S \rightarrow a B D h$
 $B \rightarrow B b \mid c$
 $D \rightarrow E F$
 $E \rightarrow g \mid \epsilon$
 $F \rightarrow f \mid \epsilon$
- c) What are the advantages and disadvantages of operator Precedence parser? [4]

OR

- Q2 a) Explain in detail the Front end – Back end arrangement of compiler design. [6]
- b) Construct SLR parser for following grammar: [8]
- $S \rightarrow a S S b$
 $S \rightarrow a S S S$
 $S \rightarrow c$
- Show moves of above parser on one valid input string and one invalid input string.
- c) How YACC handles different types of conflicts in parser? [4]

- Q3 a) Differentiate between S-attributed and L-attributed definitions. [4]
 b) What is need for semantic analysis? Explain type checker in detail. [6]
 c) Generate annotated parse tree for following expression: [6]
 $a*b-c/e + f$

OR

- Q4 a) What is attributed grammar? Explain with example. [4]
 b) Explain bottom-up evaluation of L-attributed grammar [6]
 c) What is typecasting? What changes should be made in the semantic analyzer to add typecasting? [6]
- Q5 a) Generate three address code for following code fragment. [8]
 $sum=0$
 for (j=1; j<=10; j++)
 $sum= sum + a[j] + b[j]$

- b) Write syntax directed translation scheme for simple assignment statement. [8]

OR

- Q6 a) Write syntax directed translation scheme for boolean expression and explain the need of backpatching. [8]
 b) Generate quadruples and indirect triples for following statement. [8]
 $a= b \wedge (c + d) *f/g$

SECTION-II

- Q7 a) Discuss: Static and Dynamic Scope [6]
 b) Which are different data structures used for symbol table? Discuss. [6]
 c) Discuss various issues associated with source language. [6]

OR

- Q8 a) Write short note: Activation record [4]
 b) Explain various parameter passing techniques with suitable examples. [8]
 c) Differentiate between block structured and non block structured languages [5]
- Q9 a) Explain Dynamic Programming code generation algorithm [8]
 b) Write short note: DAG [4]
 c) Discuss various issues in code generation. [4]

OR

Q10 a) Construct DAG for following [4]

$$D = B * C$$

$$E = A + B$$

$$B = B * C$$

$$A = E - D$$

Which optimization is achieved using this DAG?

b) What is “next use” information? Explain its use in code generation. [6]

c) Explain the tree labeling algorithm with example. [6]

Q11 a) Read following piece of code: [4]

B1: j = j-1

t₄ = 4*j

t₅ = a[t₄]

if t₅>j go to B1

which optimization technique can be applied to this code? Explain it in detail.

b) Explain how loops in flow graph are identified? [4]

c) Explain fundamental data flow properties. [8]

OR

Q12 a) Write short note: Global optimization [4]

b) Explain following optimization techniques: compile time evaluation, dead code elimination, code movement [6]

c) What is “ud chain”? Explain Gen set and Kill set for ud chain. [6]
