

Total No. of Questions : 12]

SEAT No. :

P1450

[4759] - 206

[Total No. of Pages : 4

B.E. (Computer Engineering)
PRINCIPLES OF COMPILER DESIGN
(2008 Course) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer three questions from Section I and three questions from Section II.*
- 2) Answers to the two sections should be written in separate answer books.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right indicate full marks.*
- 5) Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain various phases of compiler with example. List various errors detected in each phase of compiler. **[8]**
- b) Design SLR parsing table for following grammar: **[8]**
- $S \rightarrow AS|b$
- $A \rightarrow SA|a$
- c) Compare Recursive Descent parser and predictive parser. **[2]**

OR

- Q2)** a) Why Lexical analyzer and parser are two separate phases? How they are combined in single pass? **[4]**
- b) Show that following grammar is LR (1) but not LALR. **[8]**
- $S \rightarrow Aa | aAc | Bc|bBa$
- $A \rightarrow d$
- $B \rightarrow d$

P.T.O.

- c) Test whether following grammar is LL (1)? [6]

$S \rightarrow iEtSS'|a$

$S' \rightarrow eS | \epsilon$

$E \rightarrow b$

- Q3)** a) What is the need of type checking and type analysis? [4]
b) What are synthesized and inherited attributes? Give proper examples. [4]
c) What are advantages of Syntax Directed Translation (SDT)? Explain how intermediate code is generated using Top-down translation scheme. [8]

OR

- Q4)** a) What is type casting? Explain implicit and explicit type casting, with example. What changes should be made in semantic analyzer to add type casting. [8]
b) Differentiate between L-attributed definition and S-attributed definition. [4]
c) What is semantic analysis? Give some examples of errors that are detected during semantic analysis. [4]

- Q5)** a) Explain commonly used intermediate code representations. Give one example for each. [8]

- b) Write a syntax directed translation scheme for “if E then S”. [8]

Generate code for following statement using the above scheme:

if $a < b$ and $c > d$ then $a = b + c$.

OR

- Q6)** a) Give syntax directed translation scheme for Assignment statement. [6]

- b) Explain syntax directed translation scheme for Arrays. Generate quadruples for the following: [10]

$A[i][j] = B[i][j] + C[i][j]$

where A, B and C are arrays of size 10×20 .

SECTION - II

Q7) a) Explain following storage allocation schemes with proper examples.[12]

- i) Stack storage allocation
- ii) Static storage allocation
- iii) Heap storage allocation

b) For the following 'C' program, show the details of the activation records, if [6]

- i) Stack allocation is used
- ii) Heap allocation is used

```
main ( )
{
    int * p;
    p = fun ( );
}
int * fun ( )
{
    int i = 23;
    return & i;
}
```

OR

Q8) a) Explain following parameter passing techniques using suitable examples. call by value, call by reference, call restore, call by name. [8]

b) Compare static scope with dynamic scope. Illustrate with suitable example. [10]

- Q9)** a) Explain Dynamic programming algorithm for code generation. [8]
b) Explain with example: [8]
i) Basic blocks and flow graph
ii) Peephole optimization

OR

- Q10)** a) What are different issues in code generation? [6]
b) Explain simple code generation algorithm. Generate code for following 'C' program. [10]

```
main ()  
{  
    int i;  
    int a [10];  
    while (i ≤ 10)  
        a [i] = 0;  
}
```

- Q11)** a) Discuss the principle sources of code optimization. Give proper examples wherever necessary. [8]
b) Explain fundamental data flow properties. [8]

OR

- Q12)** a) What is "ud chain"? Explain Gen set and Killset for ud chain. [6]
b) What is Global common sub-expression? Write an algorithm for elimination of Global common sub-expression. [6]
c) Explain in brief: [4]
i) Reaching definitions
ii) Live variables

