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B.E. (Computer Engg.)

PRINCIPLES OF COMPILER DESIGN

(2003 Course) (410444) sem I

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates :

1) *Answers to the two sections should be written in separate answer books.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Your answers will be valued as a whole.*
5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Write a Lex specification to read a C program and calculate number of new line characters, tabs and white spaces in the program. **[8]**

b) Whether lexical analysis detects any errors? Explain with example. **[8]**

OR

Q2) a) Explain with example various Compiler Construction tools. **[9]**

b) Why compilation phases are divided into front-end and back-end? What are the advantages? **[4]**

c) Explain the following: **[3]**

i) token. ii) pattern.

iii) lexeme.

Q3) a) Show that the following grammar is LR(1) but not LALR(1). **[10]**

$S \rightarrow Aa \mid bAc \mid Bc \mid bBa$

$A \rightarrow d$

$B \rightarrow d$

b) Explain Recursive Descent parser with an example. **[8]**

OR

Q4) a) Show that following grammar is LL(1) but not SLR(1). **[8]**

$S \rightarrow AaAb \mid BbBa$

$A \rightarrow \varepsilon$

$B \rightarrow \varepsilon$

P.T.O.

b) What is Shift-Reduce and Reduce-Reduce conflict? How these can be resolved? With examples explain in which condition S-R and R-R conflict can occur in SLR, canonical LR and LALR parsers. (Make use of LR(0), LR(1) items). **[10]**

Q5) a) Write a translation scheme to generate three address code for assignment sentences with array and pointer references. **[8]**

b) Explain concept of back-patching with example. **[8]**

OR

Q6) a) Translate executable sentences of the following C program. **[8]**

```
main ( )
{     int i = 1;
      int a[10];
      while(i <= 10)
      {
            a[i]=0;
            i = i + 1;
      }
}
```

into

a) syntax tree

b) postfix notation

c) three-address code.

b) What are synthesized and inherited attributes? What are Marker Non-terminal symbols? Give example. **[8]**

SECTION - II

Q7) a) With example explain different parameter passing methods. **[8]**

b) Explain Runtime support and Storage organization. **[8]**

OR

Q8) a) What are different storage allocation strategies? Explain anyone in detail. **[8]**

b) What is "Display" mechanism? Explain it with example. **[8]**

Q9) a) What is a basic block and flow graph? Generate three address code for the following program. Find the basic blocks in it and write flow graph for the same.

```
begin
      prod : = 0;
      i : = 1;
      do
            begin
                  prod : = prod + a [i] * b[i];
            i : = i + 1;
            end
      while i <= 20
end
```

[8]

b) What is next use information explain in detail. **[8]**

OR

*Q10)*a) Explain peephole optimization in detail. **[8]**

b) What is a DAG? Explain role of a DAG in code generation phase. **[8]**

*Q11)*a) What is the need of code optimization? Discuss principal sources of code optimization. **[10]**

b) Discuss algorithm for live variable analysis. **[8]**

OR

*Q12)*a) Enlist and explain with example various transformations on basic blocks. **[8]**

b) With example explain what is Global Common Sub-expression? Write algorithm for Global Common Sub-expression Elimination. **[10]**