

Dr Arun Kr Yadav

CSE

(54)

20/11/2023

National Institute of Technology Hamirpur  
Department of Computer Science & Engineering  
End Semester Examination:2023-24  
Compiler Design (CS-313)

Branch: B.Tech+DD(CSE)

Time: 2:30 PM – 5.30 PM

Duration: 3.00 Hrs.

Semester:5<sup>th</sup>

Date: 20/11/2023

Max. Marks = 50

Note: Attempt all questions from question no. 1 to 5. Make your assumptions if required.

1. (a) Construct a DFA that accepts set of all strings:  $\{a^3\} \cup \{a^{2n}\}$  where  $n \geq 1$ .  
(b) Discuss and differentiate S-Attribute SDT and L-Attribute SDT with suitable example.  
[5+5 = 10 M]
2. (a) Check following grammar is LALR or CLR? Justify your answer  
 $S \rightarrow aAC \mid bB$   
 $A \rightarrow Abc \mid Abd \mid e$   
 $B \rightarrow f \mid g$   
 $C \rightarrow h \mid i$   
(b) Define handle and handle pruning. Explain the stack implementation of shift reduce parser with the help of example. [6+4=10 M]
3. (a) Draw syntax tree and DAG for the following statements  
(i)  $x = ((x+y) - ((x-y) * (x-y))) + ((x-y) * (x-y))$   
(ii)  $y = (a + a) - (a + a + a + (a + a + a + a + a))$ .  
(b) Discuss the specification of SDT for type checking of expression  $(2+3)=8$ . [6+4=10 M]
4. (a) Determine three address code, basic block and control flow graph of following programme.  
for(i=1 to n)  
{  
j=1  
while(j ≤ n)  
{  
A=B\*C/D;  
J=J+1  
} }  
(b) What are the characteristics of symbol table? Also explain data structures used in symbol table. [6+4=10 M]
5. (a) Consider the following C code segment  

```
x = x * 0;  
for(i = 1; i < 5; i++)  
{  
x = x + 1; y = 10;  
}  
for(i = 1; i < 5; i++)  
{  
y = y * 2;  
}
```

What types of optimizations are possible in this code segment? Specify the code segment which can be optimized with the name of suitable code optimization technique. Finally, write the optimized code.

(b) Explain the following with example  
(i) Peephole Optimization (ii) Loop Jamming  
(iii) Loop Unrolling (iv) Folding [4+6=10 M]