CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY
7ᵗʰ Semester of B. Tech. CSE Examination
Nov 2022
CS450 - Design of Language Processor

Date: 23.11.2022, Wednesday   Time: 1:30 PM to 4:30 PM   **Maximum Marks: 70**
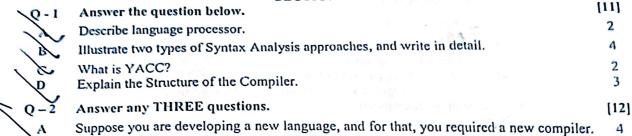
Instructions:
1. The question paper comprises two sections.
2. Sections I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of a scientific calculator is allowed.

SECTION – I

Q - 1	**Answer the question below.**	**[11]**
A	Describe language processor.	2
B	Illustrate two types of Syntax Analysis approaches, and write in detail.	4
C	What is YACC?	2
D	Explain the Structure of the Compiler.	3

Q - 2	**Answer any THREE questions.**	**[12]**
A	Suppose you are developing a new language, and for that, you required a new compiler. Elaborate on how you build a new compiler for your language and what things you will add to it.	4
B	Give the difference between a parse tree and a syntax tree.	4
C	List all Error-recovery Strategies and explain any four.	4
D	Out of the following, find the ambiguous grammar/s.	4

    1. S ⟶ SS / aSb / bSa / Ø
    2. S ⟶ aSbS / bSaS / Ø
    3. S ⟶ aAb
       A ⟶ bBb
       B ⟶ A / Ø

Here Ø is an empty string (Null) symbol.

Q - 3	**Answer any TWO.**	**[12**
A	For the given grammar perform SR (shift-reduce) parsing using the input string (a, (a, a)).	6

    S ⟶ (L) / a
    L ⟶ L , S / S

And also give what will be the maximum height of the stack.

B Consider the following grammar.

    S ⟶ AA
    A ⟶ aA / b

Create an **LR** parsing table for it.

C Construct **LL(1)** Parsing Table for the grammar given below.

    S ⟶ AB / eDa
    A ⟶ ab / c
    B ⟶ dC
    C ⟶ eC / Ø
    D ⟶ fD / Ø

Here Ø is an empty string (Null) symbol.

Page

Q - 4 Answer the question below.

A   The method which merges the bodies of two loops is?
a) Loop rolling
b) Loop jamming
c) Constant folding
d) None of the mentioned

B   Which loader function is accomplished by the loader?
a) Reallocation
b) Allocation
c) Linking
d) Loading

C   The identification of common sub-expression and replacement of run-time computations by compile-time computations is called _____ .

D   The graph that shows basic blocks and their successor relationship is called _DAG_

E   A self-relocating program is one that?
a) Cannot execute in any area of storage other than the one designated
b) Consists of a program and information for its relocation
c) None of the mentioned
d) All of the mentioned

F   Which one of the following is a top-down parser?
a) Recursive descent parser
b) Operator precedence parser
c) An LR(k) parser
d) An LALR(k) parser

G   Some code optimizations are carried out on the intermediate code because _____   2

H   From all the data structures, which is the most suitable data structure used for the symbol table, and how?   3

Q - 5 Answer any THREE questions.   [12]

A   Design the SDD for the given grammar if the sting is 10*20+30.   4

$S \rightarrow E_1$
$E \rightarrow E1 + T$
$E_1 \rightarrow T_1$
$T_1 \rightarrow T1 * F$
$T_1 \rightarrow F$
$F \rightarrow digit$

B   Study the following expression and write Three-address-code for it with a quadruple equation.   4
$P = - (a * b) + (c + d) - (a + b + c + d)$

C   Write down Peephole Optimization in detail.   4

D   DAG is used to the represent basic block structure of the program, explain with an example.   4

Q – 6. **Answer any TWO.** [12]

A Create the symbol table for the given code snippet, And list the tokens in it. 6

```
#include <stdio.h>
void main()
{
        int age;
        char name[20];
        printf("Enter your age and name");
        scanf("%d",&age);
        scanf("%s",name);
        printf("your name is %s and age is %d",name,age);
        getch();
}
```

B Build LALR (1) Parsing table for the grammar. 6

S → Aa / bAc / dc / bda
A → d

C What are the use of the activation tree and activation record in the compiler? With that how to use heap memory allocation. 6