ABC UNIVERSITY OF SCIENCE AND TECHNOLOGY

University Examination Nov 2023
Seventh Semester of B.Tech. (CE)

Design of Language Processors [CE442]

Marks: 70 **Duration: 195 mins.**

SECTION - I

Answer all the questions. Section Duration: 40 mins

1 Syntax analysis processes the string of tokens built by _____ todetermine the statement class. (1)

1)	Semantic Analyzer		2)	Lexical Analyzer		3)	Syntax Analyzer		4)	None of the above	

2 Object code is (1)

1)	ready to execute		2)	output of compiler but not assembler		3)	Must be loaded before execution		4)	Must be rewritten before execution	

3 LEX is a (1)

1)	lexical analyzer generator		2)	A parser generator		3)	Code generator – generator		4)	None of the above	

4

S → ACB | CbB | Ba

A → da | BC

B → g | ∈

C → h | ∈

_____ = { g, $, b, h } (2)

1)	First (S)		2)	Follow(A)		3)	Follow (B)		4)	Follow (C)	

5 A left recursive grammar (1)

1)	cannot be LL(1)		2)	cannot be LR(1)		3)	is an ambiguous grammar		4)	none of the above	

6 Mapping of name to storage is called _____ (1)

1)	environment		2)	state		3)	environment & state both		4)	none of the above	

7 If a grammar is LALR(1) then it is necessarily (1)

1)	SLR(1)		2)	CLR(1)/LR(1)		3)	LL(1)		4)	None of the above	

8 Which of the following expressions have no L-value? (1)

1)	a[i+1]		2)	a		3)	3		4)	*a	

9 A pictorial representation of the value computed by each statementin the basic block is (1)

1)	tree		2)	DAG		3)	Graph		4)	None of the above	

10 The error of missing right parenthesis in the statement:xyz(a,2*(3+b) is detected in (1)

1)	lexical analysis phase		2)	syntax analysis phase		3)	code generation phase		4)	code optimization phase	

11 ___ maintain the activation record of all procedures at run time. (1)

1)	control stack		2)	activation tree		3)	Procedure		4)	Macro	

12 The advantage of using parser with valid prefix property is that (1)

1)	It detects an error where it has actually occurred		2)	It detects an error much earlier than its occurrence		3)	It reports an error as possible		4)	All of the above	

13 The output of a preprocessor is (1)

1)	absolute machine language program		2)	relocatable machine language program		3)	assembly language program		4)	a high level language program	

14 In SDD ___ attribute depends on the parent node attributes. (1)

1)	Synthesized		2)	Inherited		3)	Synthesized & Inherited both		4)	None of them	

15 Which of the following loader links the subroutine with mainprogram at run time? (1)

1)	Dynamic linking		2)	Absolute Loader		3)	Compile and Go loader		4)	Bootstrap Loader	

16 Below given code is given to macro pre-processor as input.
Which one is the correct replacement done by pre-processor to
a = b + area (30) /2 ;
statement (2)

```
# define   area ( r )     (3.14 * sqr (r) )
# define   sqr ( x )    x * x

void main ( )
{
    .
    .
    a = b + area ( 30 ) / 2 ;
    .
    .
    .
}
```

1)	a = b + (3.14 * 30 * 30) / 2 ;		2)	a = b + 3.14 * 30 * 30 / 2 ;		3)	a = b + (3.14 * x * x) / 2 ;		4)	a = b + (3.14 * r * r) / 2 ;		5)	a = 3.14 * 30 * 30 ;	

17 Translator is the internal memory. (1)

1)	True		2)	False	

18			Python code to Java code conversion can be done by									(1)
	1)	Language Translator		2)	Preprocessor		3)	Language Migrator		4)	Language Detranslator	

SECTION - II

Answer 5 out of 6 questions.

1			Represent the output for the various phases of a compiler withrespect to the following assignment statement: position = initial + rate * 60 Assume the variable declarations given as below. int initial ; float position , rate ;	(5)
2			Construct the predictive parsing table for the followinggrammar. S -> aABb A -> c | ^ B -> d | ^ Also parse the input string: acdb	(5)
3			Construct SLR(1) parsing table for the following grammar: S --> 0S0 | 1S1 | 10	(5)
4			(a) Compute FIRST (X) & FOLLOW(X) for the following givengrammar. *S -> aBDh* *B -> cC* *C -> bC* | ^ *D -> EF* *E -> g* | ^ *F -> f* | ^ (b) Eliminate Left Factoring in the following grammar. A->aAB|aA|a B->bB|b	(5)
5			Construct an operator precedence table and calculate the values ofoperator precedence functions (f() and g()) for all the operatorsin below given grammar. S --> E ^ S | E E --> E + T | E - T | T T --> T * F | T / F | F F --> a	(5)
6			Describe in detail the method used in the scanning process tominimize the overhead needed to process an input character.	(5)

SECTION - III

Answer 5 out of 6 questions.

1			The single pass assembler received the below assembly code asinput. Write the assembler-generated machine code. Show all datastructures' contents that were utilized in this conversionprocedure as well.	(5)

```
        START   200
FIRST   MOVER   DREG , FIVE
        ADD     DREG , ='3'
        MOVEM   DREG , ANS
        LTORG
        MOVER   AREG , C
POINT   PRINT   ANS
        SUB     AREG , 1
        ADD     AREG , ='5'
        BC      LT , ZERO
        STOP
ANS     DS      1
C       DS      4
ZERO    DC      '0'
FIVE    DC      '5'
        END
```

Find OPTAB content below

OPTAB		
STOP	IS	(00,1)
ADD	IS	(01,1)
SUB	IS	(02,1)
MULT	IS	(03,1)
MOVER	IS	(04,1)
MOVEM	IS	(05,1)
COMP	IS	(06,1)
BC	IS	(07,1)
DIV	IS	(08,1)
READ	IS	(09,1)
PRINT	IS	(10,1)
DS	DL	R#
DC	DL	R#
START	AD	R#
END	AD	R#
ORIGIN	AD	R#
EQU	AD	R#
LTORG	AD	R#

2			Symbol Table is an important data structure created and maintainedby the compiler. What kind of data is kept in a symbol table?Additionally, describe the data structures that are used toimplement symbol tables along with their benefits and drawbacks.	(5)
3			Design a SDD to display number of 0's in given binary number.	(5)
4			List issues in the design of a code generator. Explain reduction instrength and dead code elimination in terms of code optimization.	(5)
5			Generate three address code for the below expression. Also showimplementation ways using (a) Quadruple (b) triple and (c)Indirect triple. Expression: a + (b * c)* d ^ e	(5)
6			Find basic block and draw control graph for following code writtenin higher level language. func(d) { int value=1; for (i=2; *i< =d; i++)* *value=value*i;* *return value;* *}*	(5)

-----End-----