NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: V - CARRY OVER THEORY EXAMINATION - APRIL 2023

Subject: Compiler Design

Time: 3 Hours   Max. Marks: 100

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* **three Sections -A, B, & C.** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

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SECTION A   20

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1. Attempt all parts:-

1-a.   The action of parsing the source program into proper syntactic classes is called (CO1)   1

         (a) General syntax analysis

         (b) Interpretation analysis

         (c) Syntax analysis

         (d) Lexical analysis

1-b.   Interpreter is preferred over a compiler is (CO1)   1

         (a) During program development phase

         (b) When storage space is to be minimized

         (c) When efficient use of computer resources is the consideration

         (d) All of these

1-c.   Non-Terminal also known as (CO2)   1

         (a) Variable

         (b) Constant

    (c) Function

    (d) None of above

1-d. Which function can be used to move from one state to another in DFA of 1
    parsing methods (CO2)

    (a) STATE

    (b) MOVE

    (c) CLOSURE

    (d) GOTO

1-e. Postfix notation of a + b * c is __ . (CO3) 1

    (a) abc*+

    (b) abc+*

    (c) ba+c*

    (d) None of the above

1-f. Three address code statement are (CO3) 1

    (a) Assignment Statement

    (b) Copy Statement

    (c) procedure call

    (d) All of the above

1-g. Activation Record includes some fields which are (CO4) 1

    (a) Return values

    (b) parameter list

    (c) control links

    (d) All of above

1-h. Which of the following symbol table implementation has the minimum access 1
    time? (CO4)

    (a) Self-organizing list

    (b) Search tree

    (c) Hash table

    (d) linear list

1-i. The technique of live variable analysis is used for (CO5) 1

    (a) Type checking

    (b) Code generation

    (c) Code optimization

(d) Parsing

1-j.   Which one of the following is FALSE (CO5)   1

(a) A basic block is a sequence of instructions where control enters the sequence at the beginning and exits at the en

(b) Available expression analysis can be used for common subexpression elimination.

(c) Live variable analysis can be used for dead code elimination.

(d) R = 4 x 5 => R = 20 is an example of common subexpression elimination.

2. Attempt all parts:-

2.a.   Define Finite State automata as 5-Tuple. (CO1)   2

2.b.   What are the rules to make LR(1) items? (CO2)   2

2.c.   Differentiate between annotated parse Tree and parse tree.(CO3)   2

2.d.   Explain Storage allocation techniques in the symbol table.(CO4)   2

2.e.   Define local optimization. (CO5)   2

SECTION B   **30**

3. Answer any <u>five</u> of the following:-

3-a.   What are the main two parts of compilation? What are they performing? (CO1)   6

3-b.   Describe the need of separating the analysis phase into lexical phase and parsing? (CO1)   6

3-c.   Construct CLR parsing table for the given grammar : (CO2)   6
        S-->AA
        A-->aAb

3-d.   Perform SLR parsing to parse input string " **i+i+i** " by using following grammar :   6
        (CO2)
        S->T+S
        S->T
        T->i .

3.e.   Illustrate the following expression 2+3*4 using simple desk calculator. (CO3)   6

3.f.   Explain Symbol table with various operations in details. (CO4)   6

3.g.   What is DAG? Construct the DAG for the following (assume that + is left associative)- (CO5)   6
        a+a+(a+a+a+(a+a+a+a))

SECTION C   **50**

4. Answer any <u>one</u> of the following:-

4-a.   What is NFA and DFA? Explain with examples and also differentiate between   10
NFA and DFA with suitable example. (CO1)

4-b.   Minimize DFA using Thompson Construction (CO1)   10
(a / b) * a b b (a / b) *

5. Answer any <u>one</u> of the following:-

5-a.   How LR(0) parsing is different from SLR(1) parsing? Construct SLR(1) table for: 10
(CO2)
E->E+T
E->T
T->T*F
T->F
F->(E)
F->id

5-b.   Find the FIRST and FOLLOW sets for given production rules : (CO2)   10

E -> TR
R -> +T R / ε
T -> F Y
Y -> *F Y / ε
F -> (E) / id

6. Answer any <u>one</u> of the following:-

6-a.   void main()   10
{
Int i=1;
Int a[10];
while(i<=10)
{
a[i]= 0;
i=i+1;
}
}
Create for the above code (CO3)
a) Syntax tree
b) Postfix notation
c) Three address code.

6-b.   Illustrate parse tree and annonated parse tree. Create the annonated parse   10
tree and solve expression 5+4*6 using desk calculator. (CO3)

7. Answer any <u>one</u> of the following:-

7-a.　　　Explain (a) Runtime environment & its need (b) Activation tress (CO4)　　　10

7-b.　　　Explain Error detection and recovery methods in compiler design. (CO4)　　　10

8. Answer any <u>one</u> of the following:-

8-a.　　　Define a DAG. Construct a DAG and write the sequence of instructions for the　　10
　　　　　expression- (CO5)
　　　　　a+a*(b-c)+(b-c)*d

8-b.　　　What is code generation, explain in detail? Generate the code for the following　　10
　　　　　C program- (CO5)
　　　　　　main()
　　　　　　　{
　　　　　　　　int i;
　　　　　　　　int a[10];
　　　　　　　　while(i<=10)
　　　　　　　　a[i]=0;
　　　　　　　}