

Code No: R18A1202

**MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**

(Autonomous Institution – UGC, Govt. of India)

**II B.Tech II Semester Supplementary Examinations, February 2021****Automata and Compiler Design****(IT)**

<b>Roll No</b>									
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**Time: 2 hours 30 min****Max. Marks: 70**

Answer Any **Five** Questions  
All Questions carries equal marks.

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- 1 a) How do you recognize the tokens? Explain it. [7M]  
b) Illustrate the construction of Non Deterministic Finite Automata for the Regular Expression:  $(a+b)^*a$ . [7M]
- 2 Explain about Chomsky hierarchy of languages and recognizer. [14M]
- 3 a) Identify the rule to eliminate left recursion in a grammar. Prepare and eliminate the left recursion for the grammar.  
 $S \rightarrow Aa \mid b$  [5M]  
 $A \rightarrow Ac \mid Sd \mid \epsilon$  [5M]  
b) Compute FIRST and FOLLOW for the following grammar. [4M]  
 $S \rightarrow A, A \rightarrow aB \mid Ad \quad B \rightarrow bBC \mid f \quad C \rightarrow g$
- 4 a) Write syntax directed definition for simple desk calculator. Using this definition draw annotated parse tree for  $3*5+4n$ . [7M]  
b) Interpret the method of generating intermediate code for flow control statements. [7M]
- 5 a) Outline the type-checking rule for overloaded functions with example. [8M]  
b) Explain the unification algorithm by us type checking concepts. [6M]
- 6 Describe the specification of simple type checker for statements, expressions and functions. [14M]
- 7 a) List the features of copy restore linkage in passing arguments. [7M]  
b) Describe in detail about dynamic storage allocation. [7M]
- 8 a) Discuss the following: [6M]  
i. Copy propagation  
ii. Dead code elimination and code motion. [8M]  
b) Build the algorithm for the code generation from the three-address code.

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**MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**

(Autonomous Institution – UGC, Govt. of India)

**II B.Tech II Semester Regular/Supplementary Examinations, July 2021****Automata and Compiler Design****(IT)**

<b>Roll No</b>									
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**Time: 3 hours****Max. Marks: 70**Answer Any **Five** Questions

All Questions carries equal marks.

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- 1 (a) Write the procedure to convert NFA to its equivalent DFA. [7M]  
 (b) Minimize the following DFA ( $\rightarrow$ Start state, \*End state) [7M]

	a	b
$\rightarrow A$	B	D
B	C	E
C	B	E
D	C	E
* E	E	E

- 2 (a) Design a DFA for the following language. [7M]  
 $L = \{ 0^m 1^n / m \geq 0 \text{ and } n \geq 1 \}$   
 (b) Design DFA to accept strings with **c** and **d** such that number **d**'s are divisible by 4. [7M]
- 3 (a) Explain about the different types of Three Address Statements. [7M]  
 (b) Consider the Grammar. [7M]

E  $\rightarrow$  E + TE  $\rightarrow$  TT  $\rightarrow$  T \* FT  $\rightarrow$  FF  $\rightarrow$  (E) / id

Construct an LR parsing table for the above grammar. Give the moves of the LR parser on id \* id + id

- 4 (a) Construct SLR parsing table [7M]  
 E  $\rightarrow$  E + T / T  
 T  $\rightarrow$  T \* F / F  
 F  $\rightarrow$  (E) / id

From the above grammar, show all moves for the parsing of input string " id + id \* id" using the table.

- (b) Explain the structure of YACC program with a suitable example. [7M]
- 5 (a) Explain in brief about Type checking and Type Conversion. [7M]  
 (b) Explain about the procedure for checking polymorphic functions. [7M]
- 6 (a) Explain in detail about Polymorphism. [7M]  
 (b) Explain in brief about Chomsky hierarchy of languages. [7M]
- 7 Write briefly about various loop optimization techniques with examples. [14M]
- 8 Explain in detail register allocation and assignment. [14M]

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Code No: **R17A1201****MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY****(Autonomous Institution – UGC, Govt. of India)****III B.Tech I Semester Supplementary Examinations, July/August 2021****Automata & Compiler Design****(IT)**

<b>Roll No</b>									
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**Time: 3 hours****Max. Marks: 70**Answer Any **Five** Questions

All Questions carries equal marks.

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- 1 a) Draw the transition diagram for NFA which accepts all strings with two consecutive 0's. [7M]  
b) Construct DFA accepting the set of all strings containing 101 as a substring. [7M]
- 2 Explain the input buffer scheme for scanning the source program. How the use of sentinels can improve its performance? Describe in detail. [14M]
- 3 Consider the following grammar [14M]  
 $S \rightarrow (L) | a$   
 $L \rightarrow L, S | S$   
 Construct leftmost derivations and parse trees for the following sentences:  
 $(a, (a, a))$   
 $(a, ((a, a), (a, a)))$ .
- 4 Construct Predictive Parsing table for the following Grammar [14M]  
 $G:$   
 $S \rightarrow iCtSS^1 / a$   
 $S^1 \rightarrow eS / \epsilon$   
 $C \rightarrow b$   
 Check the above grammar is LL(1) or not.
- 5 What are the limitations of Static Storage Allocation? Explain the problem of dangling references. [14M]
- 6 Give SDT Scheme to construct *Syntax Tree*. [14M]
- 7 a) Write and explain about organization for an optimizing compiler. [7M]  
b) What are the applications of DAG? Explain how the following expression can be converted in a DAG. [7M]  
 $a+b*(a+b)+c+d$
- 8 a) Explain how copy propagation can be done using data flow equation. [7M]  
b) Explain in detail about machine dependent code optimization. [7M]

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Code No: R17A1201

## MALLA REDDY COLLEGE OF ENGINEERING &amp; TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

## III B.Tech I Semester Supplementary Examinations, February 2021

## Automata &amp; Compiler Design

(IT)

Roll No									
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Time: 2 hours 30 min

Max. Marks: 70

Answer Any **Five** Questions

All Questions carries equal marks.

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- 1 Explain the different phases of compiler, showing the output of each phase, using the given statement **position:= initial+rate\*60** [14M]
- 2 Write the formal definition of an NFA. List the closure properties of regular expression. Convert the given regular expression to  $\epsilon$ -NFA  $a^*b^*+ab^*+a^*b$ . [14M]
- 3 Considering the following grammar, remove left recursion and left factor and design LL(1) parsing table. [14M]
 
$$E \rightarrow E + T / T$$

$$T \rightarrow T * F / F$$

$$F \rightarrow (E) / id$$
- 4 Construct SLR parsing table for the grammar  $S \rightarrow CC$  ,  $C \rightarrow a | d$ . [14M]
- 5 What is Type Expression? Write Type Expressions for the following Types. [7M]
  - a) An array of pointers to real, where the array index ranges from 1 to 100 [7M]
  - b) Function whose domains are functions from integers to pointers to integers and whose ranges are records consisting of an integer and a character.
- 6 What is Static Checking? List out some examples of Static Checks. [14M]
- 7 a) What do you mean by *loop optimization*? Illustrate with an example. [7M]
  - b) What is the use of *Frequency Reduction*? Give an example. [7M]
- 8 Write and explain about Peephole Optimization. [14M]

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Code No: **R18A1202****MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**

(Autonomous Institution – UGC, Govt. of India)

**II B.Tech II Semester Regular Examinations, October/November 2020****Automata and Compiler Design****(IT)**

<b>Roll No</b>									
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**Time: 2 hours****Max. Marks: 70**

Answer Any **Four** Questions  
All Questions carries equal marks.

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- 1 a) How do you organize NFA from Regular expression? Ideate NFA for the given regular expression  $(a/b)^*a$ .  
b) Construct a DFA, which accepts set of all string over  $\{0,1\}$  which when interpreted as binary number is divisible by '3'
  - 2 a) Relate the lexical analysis with parsing.  
b) Compose a predictive parser for the following grammar:  

$$E \rightarrow TE'$$

$$E' \rightarrow +TE' \mid \epsilon$$

$$T \rightarrow FT'$$

$$T' \rightarrow *FT' \mid \epsilon$$

$$F \rightarrow (E) \mid id$$
- Consider the predictive parsing table and show the stack implementation for the input string:  $id+id*id$ .
- 3 a) Discover the rule to eliminate left recursion in a grammar. Prepare and eliminate the left recursion for the grammar.  

$$S \rightarrow Aa \mid b$$

$$A \rightarrow Ac \mid Sd \mid \epsilon$$
  - 4 a) Criticize the syntax-Directed translation schemes.  
b) Examine how the names can be looked up in the symbol table?
  - 5 Explore about the context sensitive features and identify the relation between the recursive and context sensitive language.
  - 6 Recognise the specification of simple type checker.
  - 7 a) What is peephole optimization? Explain with example.  
b) Consider the following loop, generate three address code and draw the flow graph

```

Begin
  Prod=0
  i=1
  do
    Begin
      Prod=Prod+a[i]*b[i]
      i=i+1
    End
  While (i≤20)

```

End

- 8**
- a) Discuss the code generation phase with simple code generation algorithm.
  - b) Formulate a code for the following expression and compute its cost  
 $X=(a+b)*(c-d)+((e/f)*(a+b)).$

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**III B.Tech I Semester Supplementary Examinations, October 2020****Automata & Compiler Design****(IT)**

<b>Roll No</b>									
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**Time: 2 hours****Max. Marks: 70**

Answer Any **Four** Questions  
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- 1 What is a Compiler? Explain Phases of Compiler in detail? Write the Phases of Compiler for the given statement  $a: = b + c * 10$ .
- 2 Define Context Free Grammar. What are Problems in Top Down Parsing, explain them in detail with an example?
- 3 Construct the LL(1) Parsing for the following Grammar.  
 $E \rightarrow TE^1$   
 $E^1 \rightarrow +TE^1 / \epsilon$   
 $T \rightarrow FT^1$   
 $T^1 \rightarrow * FT^1 / \epsilon$   
 $F \rightarrow ( E ) / id$
- 4 a). Define Syntax directed translation.  
b). Explain Synthesized attribute, Inherited attribute, Dependency graph, Evaluation order with an example.
- 5 Explain Chomsky hierarchy of Languages.
- 6 What are type expressions and explain them.
- 7 What are the functions of Local Optimization? Explain each function with an example.
- 8 Explain the characteristics of Machine Code Generator with an example.

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