B. Tech 5th Semester (CSE-Data Science) (G-Scheme)
Examination, December-2023
AUTOMATA THEORY AND COMPILER DESIGN
Paper–PCC-DS-305G

Time allowed : 3 hours] *[Maximum marks : 75*

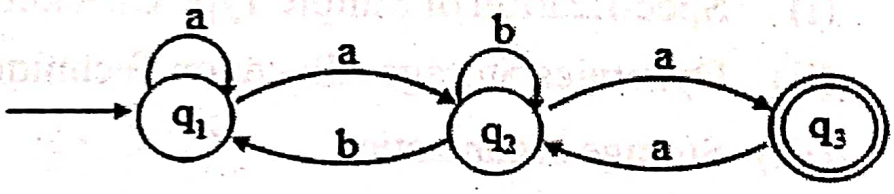
Note : Attempt **five** questions selecting **one** question from each Section and **Question No. 1 is compulsory.**

1. Describe the following: 15
   (a) Difference between DFA and NDFA.
   (b) Define specification and recognition of token briefly.
   (c) Describe the role of parser.
   (d) Discuss Chomsky hierarchy of grammar.
   (e) Describe the condition of acceptability of Pushdown automata.
   (f) What is syntax trees? Explain with the help of example.

Section–A

2. (a) Explain the architecture of the compiler and its phases in detail. 8

   (b) Consider the transition system given below and convert it into its equivalent regular expression. 7



3. (a) Explain the steps to find first and follow of a given grammar. 5

(b) What is bottom-up parsing? Explain the shift-reduce parsing with the help of given string id + id * id 10

Section–B

4. (i) What is intermediate code representation? Convert the following into three address code, quadruples, triples and indirect triples. 10

(a) $-a(a+b)*(c+d)+(a+b+c)$

(b) $A=-B*(C+D)$

(ii) What is PDA? Construct a PDA accepting the set of strings over {a, b} with equal no's of a's and b's. 5

5. (i) What is Turing machine? What is its different variant? Explain. 7

(ii) What is syntax-directed translation scheme? How to construct the syntax tree. Explain with the help of an example. 8

Section–C

6. Briefly explain: 15

(i) Specification of Simple Type Checker.

(ii) Dynamics Storage Allocation Techniques.

(iii) Storage organization.

7. (i) Explain various Storage Allocation Strategies in detail. 8

(ii) What is Symbol Table? Explain any two data structures of the symbol table briefly. 7

Section–D

8. (i) What is code generation? Briefly explain the register allocation for temporary and user-defined variables. 10

(ii) Discuss the DAG representation of the basic block briefly. 5

9. What do you mean by the term code optimization? What do you understand by the term leader? Write an algorithm to identify the basic blocks. 15