

THIRD SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2023

COMPUTER SCIENCE AND MATHEMATICS (DOUBLE MAIN)

GDSC3B05T: THEORY OF COMPUTATION

Time: 2 Hours

Maximum Marks: 60

**SECTION A: Answer the following questions. Each carries *two* marks.
(Ceiling 20 Marks)**

1. Define context free language.
2. What is recursive set?
3. Define finite automata.
4. Explain Regular Expression.
5. Draw a NFA to accept strings containing the substring 0101
6. Explain transition table and transition graph.
7. What are unit productions?
8. Construct a CFG for the language $L = \{a^n b^{2n} | n \geq 0\}$.
9. Define Turing Machine.
10. What is halting problem?
11. What is top down parser?
12. What do you mean by Empty Stack Acceptability?

**SECTION B: Answer the following questions. Each carries *five* marks.
(Ceiling 30 Marks)**

13. Explain Type1 grammar with example.
14. Differentiate between recursive and recursively enumerable set.
15. Explain algebraic laws for regular expression.
16. Elaborate on ambiguous grammar with example.
17. Find LMD & RMD, parse tree for the following grammar.

$w = 00110101$

$S \Rightarrow 0B / 1A$

$A \Rightarrow 0/0S/1AA$

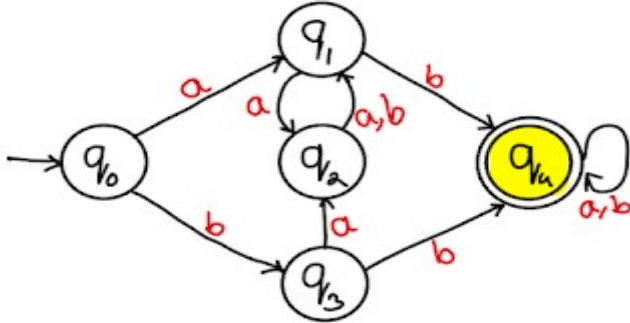
$B \Rightarrow 1/1S/0BB$

18. Check whether the grammar $S \rightarrow Sa|aS|a$ is ambiguous or not.
19. Differentiate between DPADA and NDPDA.

(PTO)

SECTION C: Answer any *one* question. Each carries *ten* marks.

20. Construct a minimum state automata equivalent to the given automata.



21. Construct a Turing Machine that recognizes the language 0^n1^n .

(1 x 10 = 20 Marks)