

THIRD SEMESTER UG DEGREE EXAMINATION, NOVEMBER 2023**(Regular/Improvement/Supplementary)****BCA****GBCA3C06T: THEORY OF COMPUTATION****Time: 2 Hours****Maximum Marks: 60****SECTION A: Answer the following questions. Each carries *two* marks.****(Ceiling 20 Marks)**

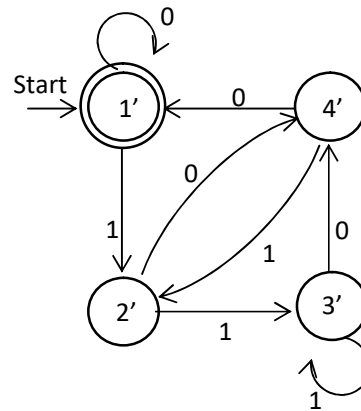
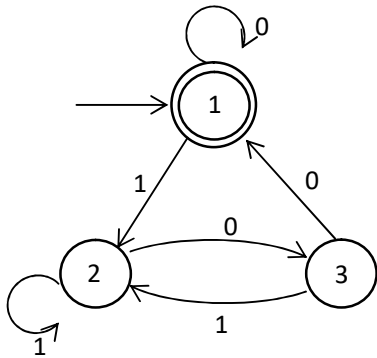
1. What is Singleton set?
2. Explain subtree with example.
3. What is Formal Language?
4. Explain Type 3 Grammar.
5. Obtain a regular expression representing strings of a's and b's having length 2.
6. Show that $L = \{0^n 1 0^{2n}, n \geq 0\}$ is not regular.
7. What is Mealy Machines?
8. What is Grammar?
9. List out the applications of context free grammars.
10. Eliminate ϵ -Productions from the following grammar.
$$S \rightarrow Xa$$
$$X \rightarrow aX \mid bX \mid \epsilon$$
11. Define Chomsky Normal form.
12. What is PDA?

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

13. Explain proper suffix of a string with example.
14. Differentiate between Recursive Languages and Recursively Enumerable Languages.

(PTO)

15. Find out whether these two FA's are equivalent or not.



16. Obtain a grammar to generate the following language

$$L = \{a^n b^{n+1} : n \geq 0\}$$

17. Eliminate unit Productions from the grammar.

- $S \rightarrow Aa \mid B \mid Ca$
- $B \rightarrow aB \mid b$
- $C \rightarrow Db \mid D$
- $D \rightarrow E \mid d$
- $E \rightarrow ab$

18. Convert CFG to PDA

- $S \rightarrow aABB \mid aAA$
- $A \rightarrow aBB \mid a$
- $B \rightarrow bBB \mid A$
- $C \rightarrow a$

19. Explain the conversion of Context Free Grammar to Push Down Automata.

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

20. Design a DFA which accepts set of all strings containing odd numbers of zeros and even numbers of ones where string is treated as binary numbers.

21. Obtain a Turing Machine to accept a palindrome consisting of a's and b's of any length.

(1 x 10 = 20 Marks)