

THIRD SEMESTER UG DEGREE EXAMINATION, NOVEMBER 2024

(Regular/Improvement/Supplementary)

BCA

GBCA3C06T: THEORY OF COMPUTATION

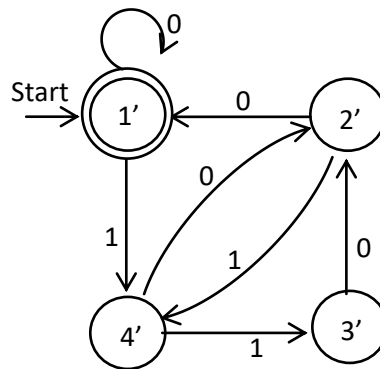
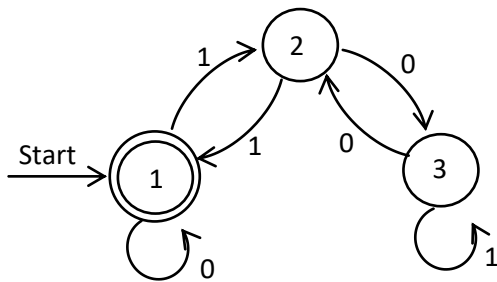
Time: 2 Hours

Maximum Marks: 60

SECTION A: Answer the following questions. Each carries *two* marks.

(Ceiling 20 marks)

1. Explain language accepted by a Turing Machine.
2. Obtain grammar to generate strings of a's and b's, such that string length is multiple of 3.
3. What is Height of a tree?
4. Explain Type 2 Grammar.
5. Design DFA which does not accept set of all binary strings ending with 000.
6. Find out whether these two FA's are equivalent or not.



7. Obtain a regular to accept strings of a's and b's whose second symbol from the right end is 'a'.
8. Explain Linear Bounded Automata.
9. Define Greibach Normal Form.
10. What is Empty relation?
11. How to represent a Turing Machine?
12. When a language is accepted by Push Down Automata?

(PTO)

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

13. Convert CFG to PDA

$S \rightarrow aABC$

$A \rightarrow aB / a$

$B \rightarrow bA / b$

$C \rightarrow a$

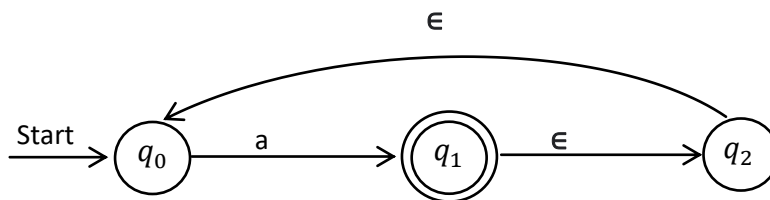
14. Show that if x is an integer, and if $3x+2$ is even, then x is even by proof by contradiction.

15. Design NFA which accept set of all strings containing 3rd symbol from left side is 1.

16. Convert the regular expression $r = (11 + 0)^*(00 + 1)^*$ to ϵ -NFA.

17. Differentiate Recursive Languages and Recursively Enumerable Languages.

18. Convert the following ϵ -NFA to DFA.



19. Obtain a grammar to generate the following language:

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

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

20. Simplify the following CFG and convert it into CNF.

$S \rightarrow AaB \mid aaB$

$A \rightarrow \epsilon$

$B \rightarrow bbA \mid \epsilon$

21. Obtain a PDA to accept a string of balanced parentheses. The parentheses to be considered are $(,)$, $[,]$.

(1 x 10 = 20 Marks)