

VIJAYA DEGREE COLLEGE
VI SEM BCA
Model Question paper-3
Computer Science
BCA 601: THEORY OF COMPUTATION

TIME: 3 hrs

MARKS: 100

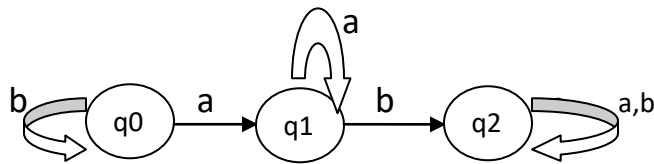
INSTRUCTION : ANSWER ALL SECTIONS

SECTION-A

Answer any TEN questions .Each question carries TWO marks

10X2=20

1. What is Finite Automata. Explain with a block diagram.
2. What are the moves made by the following DFA while processing the string abaab? Find if the string is accepted or rejected by DFA. (q_2 –final state, q_0 -start state)



3. Mention any two properties of regular languages.
4. Define grammar with a suitable example.
5. Design a regular expression for the language accepting string having exactly length 2.
6. Mention any two properties of context free languages.
7. Define Nullable variable.
8. Define recursively enumerable language.
9. Define ϵ -transition with a suitable example.

10. Explain the mathematical representation of pushdown automata with a suitable example.
11. Define halting problem of Turing machine.
12. State Arden's theorem.

SECTION-B

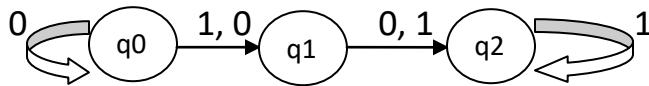
Answer any FIVE questions. Each question carries FIVE marks 5X10=50

13. Construct a DFA to accept strings of 0's and 1's representing zero modulo five.
14. Define NFA. Obtain NFA to accept the language $L = \{w \mid w \in abab^n \text{ or } aba^n \text{ where } n \geq 0\}$
15. Using pumping lemma prove the language $L = \{yy \mid y \in (0,1)^*\}$ is not regular.
16. Define CFG. Obtain a CFG for the following language
 $L = \{a^n b a^n \mid n \geq 1\}$
17. What is a Turing Machine? Explain the different types of Turing Machine.
18. Rewrite the following grammar after eliminating the useless symbols and nullable variables
S → AAB | ASD
A → a
B → c
C → D
D → Dd | ε
19. Explain the Chomsky hierarchy of grammar.
20. Prove that CFL's are closed under closure.

SECTION-C

Answer any THREE questions. Each question carries FIFTEEN marks 3*15=45

19. Convert the following NFA to equivalent DFA



- 20. Construct DFA for a regular expression $(a+b)^*ab(a+b)^*$
- 21. Check whether the given grammar is ambiguous $S \rightarrow aSa \mid bSb \mid \epsilon$ for string $w=aabb$. Draw the parse tree.
- 22. Prove that regular languages are closed under Kleene closure and intersection.
- 23. Define PDA. Obtain PDA to accept the language $L = \{0^n 110^n \mid n \geq 1\}$
- 24. Construct a Turing machine to accept the language $L = \{0^n 10^n \mid n \geq 1\}$
- 25. Design a CFG for a language that accepts strings ending with 01 over $\{0,1\}$

SECTION-D

Answer any ONE question. Each question carries TEN marks 1*10=10

26. Minimize the given DFA using table filling algorithm

| | | |
|----|---|---|
| \$ | a | b |
| A | B | A |
| B | A | C |
| C | D | B |
| D | D | A |
| E | D | F |

- 27. Write short notes on
 - (a) Post Correspondence Problem of Turing machine
 - (b) Recursively enumerable languages

