15528

Reg. No. | | | | | | | | |

V Semester B.C.A. Degree Examination, March/April - 2023

COMPUTER APPLICATIONS

Theory of Computation

(CBCS Scheme 2019-20)

Time : 3 Hours **Maximum Marks :100**

Instructions to Candidates:

Answer all Sections.

SECTION - A

Answer any TEN questions. Each question carries 2 marks. **(10×2=20)**

1. Define DFA with mathematical representation .
2. Define transition table. Give an example.
3. What is trap state? Give an example.
4. Define Regular Expression.
5. State Arden's theorem.
6. Define Grammar. Give an example.
7. Define Push Down Automata.
8. What is Parsing (Derivation) and its types.
9. Define CNF.
10. Define Left - recursion.
11. Define Turing machine.
12. Define Post correspondence problem.

[P.T.O.

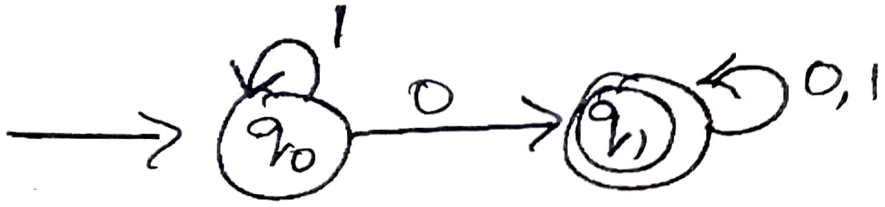
SECTION - B

Answer any FIVE questions. Each question carries 5 marks. (5×5=25)

13. Differentiate between DFA, NFA and $\in$-NFA.

14. Construct a DFA to accept the strings of a's and b's not ending with the substring abb.

15. Obtain a regular expression for the finite Automata shown below (using Kleene's theorem).



16. Prove the given Language is not a regular. $L = \{ww^R / w \in (a+b)^*\}$.

17. Obtain the Left most derivation and right most derivation for the string 00112. The production rules are given by

$$
\begin{aligned}
P = \{ & \\
& S \rightarrow AB \\
& A \rightarrow 01 \mid 0A1 \\
& B \rightarrow \in \mid 2B \\
\} &
\end{aligned}
$$

18. Write a note on Chomsky hierarchy.

19. Show that the given grammar is ambiguous.

E → E+E

E → E-E

E → E*E

E → E/E

E → (E)

E → id

20. Explain types of Turing machine.

SECTION - C

Answer any THREE questions. Each question carries 15 marks. (3×15=45)

21. Convert the following NFA to its equivalent DFA.

22. Minimize the following DFA.

	δ	0	1
→	A	B	D
	B	C	E
	C	B	E
	D	C	E
*	E	E	E

23. Obtain the PDA to accept the language $L = \{a^n\ b^n \mid n \geq 1\}$

24. Consider the following grammar.

S → 0A/1B

A → 0AA/1S/1

B → 1BB/0S/0

Obtain the grammar in CNF.

25. a) Eliminate the unit productions from the given grammar **(10)**

S → A 0/B

B → A/11

A → 0/12/B

b) Explain the various applications of Regular expression. **(5)**

SECTION - D

Answer any ONE question. Each question carries 10 marks. **(1×10=10)**

26. Construct a $\in$-NFA for the regular expression (a+b)* aa (a+b)*

27. Obtain the Turing machine to accept the language $L = \{0^n\ 1^n \mid n \geq 1\}$