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Reg. No.

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VI Semester B.C.A. Degree Examination, August/September - 2023

COMPUTER SCIENCE

Theory of Computation

(CBCS Scheme Repeater)

Time : 3 Hours

Maximum Marks :100

Instructions to Candidates:

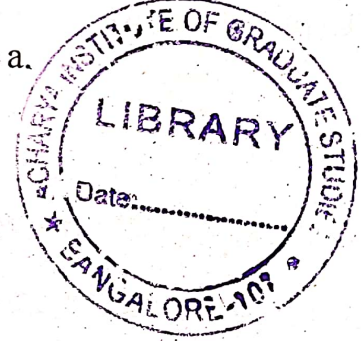
Answer all Sections.

SECTION - A

Answer any Ten questions. Each carries 2 marks.

(10×2=20)

1. Define Automata
2. What is trap state?
3. What do you mean by transducer?
4. Draw a DFA to accept strings of a's and b's having atleast one a.
5. State Arden's theorem.
6. Mention any two applications of Regular expression.
7. State pumping lemma for regular languages.
8. Define grammer.
9. What are the classifications of Normal forms?
10. Define CNF.
11. What is multitape TM?
12. Define Port correspondence problem.



SECTION - B

Answer any Five questions. Each carries 5 marks.

(5×5=25)

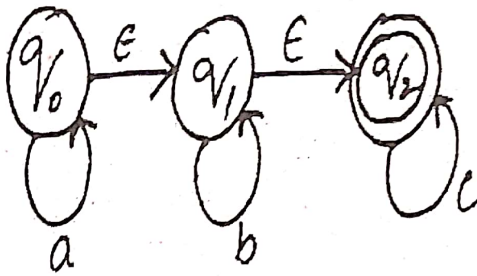
13. Explain DFA with suitable example.
14. Construct a DFA to accept the strings of a's and b's ending with the string ab.
15. Differentiate between DFA and NFA.

[P.T.O.]





16. Convert the following NFA to DFA.



17. Obtain a regular expression such that $L(R) = \{w / w \in (0,1)^*\}$ with atleast three consecutive 0's.

18. Explain chomskys hierarchy.

19. Define ambiguous grammar. Check Whether the given grammar is ambiguous.

$$S \rightarrow aS \mid X$$

$$X \rightarrow aX \mid a$$

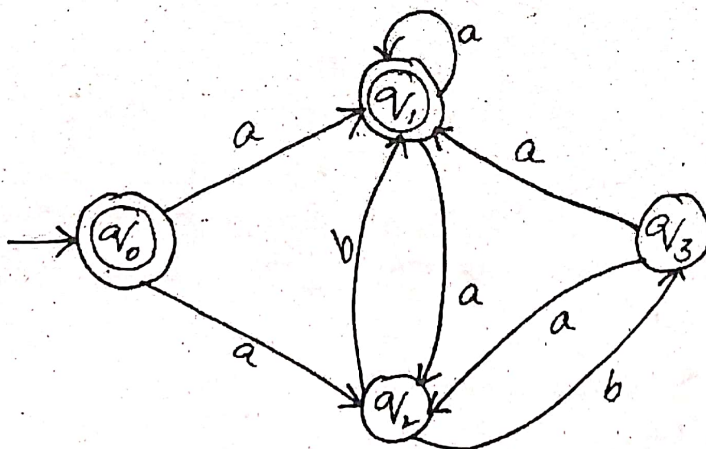
20. Explain halting problem of Turing Machine.

SECTION - C

Answer any Three questions. Each carries 15 marks.

(3×15=45)

21. Convert the following NFA to its equivalent DFA.





22. Minimize the States of following DFA.

States	Σ	
	0	1
$\rightarrow A$	B	F
B	G	C
ⓐ	A	C
D	C	G
E	H	F
F	C	G
G	G	E
H	G	C

23. Obtain the string aaabbabbba by applying left most derivation. Is the grammer ambiguous?

$$S \rightarrow aB \mid bA$$

$$A \rightarrow aS \mid bAA \mid a$$

$$B \rightarrow bS \mid aBB \mid b$$

24. Convert the following grammar into CNF

$$S \rightarrow 0A \mid 1B$$

$$A \rightarrow 0AA \mid 1S \mid 1$$

$$B \rightarrow 1BB \mid 0S \mid 0$$

25. Obtain a PDA to accept the language $L = \{w C w^R \mid w^R \text{ is the reverse of } w, w \in (0,1)^*\}$.

SECTION - D

Answer any One question. Each carries 10 marks.

(1×10=10)

26. Write a note on recursively enumerable languages.

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