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15621

Reg. No.

COMPUTER SCIENCE
Theory of Computation
(CBCS Scheme)

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 finite Automata.

2. Draw a DFA to accept strings of even numbers of a's.

3. What is pumping lemma?

4. State Arden's theorem.

5. Obtain a RE to accept the set of strings contains exactly one a over $\Sigma = \{a,b,c\}$.

6. Write the basic operations of Regular expressions with example.

7. Mention different types of Grammar.

8. Mention any two Applications of CFG.

9. Explain parsing with an example.

10. Define GNF.

11. What is Turing Machine?

12. State post correspondence problem.

SECTION - B

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

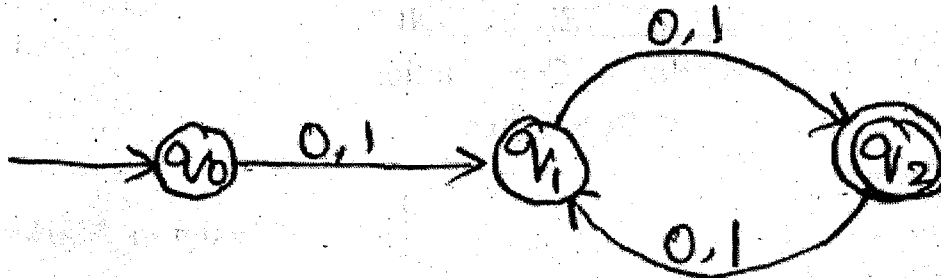13. Construct a DFA to accept strings of 0's and 1'S starting with atleast two 0's and ending with atleast two 1's.

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14. Design a NFA to accept the strings ending in 00 and check whether the string 100 is accepted by the NFA.

15. Construct RE from the given DFA.

16. Show that $L = \left\{ WW^R / W \in (a+b)^* \right\}$ is not regular, W^R is reverse of the string W.

17. Construct a parse tree from the grammar

    $S \rightarrow aB / bA$

    $A \rightarrow a / aS / bAA$

    $B \rightarrow b / bS / aBB$

    for the string W = aaabbabbba, by applying left most derivation.

18. Write short note on chomskey hierarchy of languages.

19. Reduce the following grammar to CNF

    $S \rightarrow OA / 1B$

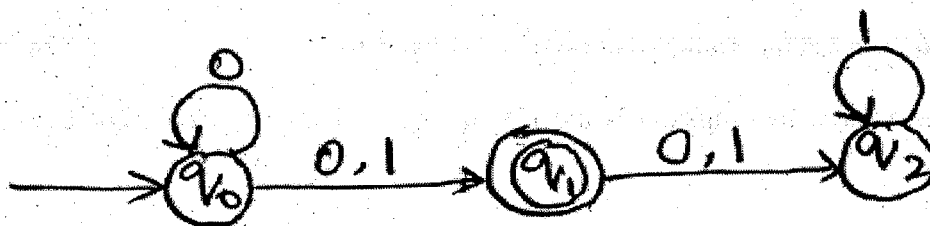 $A \rightarrow OAA / 1S / 1$

    $B \rightarrow 1BB / OS / O$

20. Explain Halting problem 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.

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22. Minimize the following DFA using table filling algorithm.

S	0	1
→ A	B	F
B	G	C
* C	A	C
D	C	G
E	H	F
F	C	G
G	G	E
H	G	C

23. Define pushdown Automata. Obtain a PDA to accept the language $L = \{WCW^R / W \in (a+b)*\}$ Where W^R is Reverse of W. **(15)**

24. Transform the CFG to GNF **(15)**

$S \rightarrow AB$

$A \rightarrow BS / 1$

$B \rightarrow SA / 0$

25. Obtain a T_m that accepts all strings of form $a^n b^n$ for $n \geq 1$. **(15)**

SECTION - D

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

26. Construct a NFA with $\in$ for the RE $(0+1)*.1.(0+1)$.

27. a. Eliminate all unit production from the grammar. **(5)**

$S \rightarrow AB$

$A \rightarrow a$

$B \rightarrow C / b$

$C \rightarrow D$

$D \rightarrow E$

$E \rightarrow a$

b. Eliminate all $\in$ productions from the garmmar. **(5)**

$S \rightarrow aS / AB$

$A \rightarrow \in$

$B \rightarrow \in$

$D \rightarrow b$