Long Questions

1. What is a Pushdown Automaton (PDA)?
2. Explain the components of a PDA and their functions.
3. How does a PDA differ from a Finite Automaton (FA)?
4. Describe the concept of the languages recognized by a PDA.
5. What is the significance of the stack in a PDA?
6. Explain the process of acceptance by final state in a PDA.
7. How does acceptance by empty stack differ from acceptance by final state in a PDA?
8. Define Deterministic Pushdown Automaton (DPDA).
9. How are DPDA's different from non-deterministic PDAs?
10. Discuss the conversion process from a CFG to a PDA.
11. Explain the steps involved in converting a PDA to a CFG.
12. What are the steps to eliminate useless symbols in a CFG?
13. Describe the process of eliminating ε-productions from a CFG.
14. Define Chomsky Normal Form (CNF) for CFGs.
15. Explain the rules for transforming a CFG into CNF.
16. What is Greibach Normal Form (GNF) for CFGs?
17. Discuss the advantages of GNF over CNF.
18. State the pumping lemma for context-free languages.
19. How is the pumping lemma useful in proving languages non-context-free?
20. Provide an example application of the pumping lemma.
21. What are closure properties of context-free languages?
22. Explain closure under union for CFLs.
23. Discuss closure under concatenation for CFLs.
24. Describe closure under Kleene star for CFLs.
25. What are the decision properties of CFLs?
26. Explain the decidability of membership problem for CFLs.
27. Discuss the decidability of emptiness problem for CFLs.

28. Define Turing Machine (TM) and its components.
29. Describe the formal description of a Turing Machine.
30. What is an instantaneous description in a TM?
31. How is the language of a Turing machine defined?
32. What types of Turing machines are there?
33. Discuss Turing machines and halting problem.
34. Explain the concept of undecidability.
35. Provide an example of a language that is not recursively enumerable.
36. Discuss an undecidable problem that is recursively enumerable.
37. Explain the concept of undecidable problems about Turing machines.
38. What are recursive languages?
39. List some properties of recursive languages.
40. Define Post's Correspondence Problem (PCP).
41. Explain how PCP works and its significance.
42. What is the Modified Post Correspondence Problem?
43. Discuss the differences between PCP and modified PCP.
44. Provide examples of other undecidable problems.
45. What are counter machines and their relation to undecidability?
46. How can counter machines be used to show undecidability?
47. Discuss the closure properties of context-free languages.
48. Explain how union closure is demonstrated for CFLs.
49. Describe the closure under concatenation for CFLs.
50. Discuss the closure under Kleene star for CFLs.
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