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B.Sc./5th Sem (H)/COMP/23(CBCS)

2023

5th Semester Examination

COMPUTER SCIENCE (Honours)

Paper : C 12-T

[Theory of Computation]

[CBCS]

Full Marks : 60 Time : Three Hours

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

Group - A

Answer any ***ten*** of the following questions : 2×10=20

1. State the definition of pumping lemma for regular set.
2. What is recursively enumerable language?
3. What is Turing Machine?
4. What is inherent ambiguous grammar?
5. Define DFA.

P.T.O.

6. What is the principle of mathematical induction?

7. Define Transition Diagram.

8. Differentiate regular expression and regular language.

9. What is parse tree?

10. What is Type-2 grammar?

11. What are the closure properties of CFL?

12. Find the regular expression for Strings of (a, b) having at least two 'b's.

13. What is undecidable problem?

14. What are the different types of languages accepted by a PDA and define them?

15. Differentiate L^* and L^+.

Group - B

Answer any ***four*** questions. 5×4=20

16. Prove any two closure properties of regular language.

17. Convert the following grammar into CNF :

$S \to cBA, S \to A, A \to cB, A \to AbbS, B \to aaa.$

18. Construct the PDA accepting the language $\{(ab)^n \mid n \geq 1\}$ by empty stack.

19. Distinguish NFA and DFA with examples.

20. What is non-deterministic PDA? Explain with an example.

21. What is ε-closure (q)? Explain with an example.

Group - C

Answer any ***two*** questions. 10×2=20

22. Prove that the halting problem is undecidable.

23. State and prove the pumping lemma for CFL.

24. During a Turing Machine which reverses the given string $\{abb\}$.

25. Using pumping lemma for the regular sets, prove that the language $L = \{a^m b^n \mid m \rangle n\}$ is not regular.
