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Question Paper Code: 35024

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

Fifth Semester

Computer Science and Engineering

01UCS504 – THEORY OF COMPUTATION

(Regulation 2013)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. Define finite automata.
2. Define NFA with ϵ transition.
3. Define regular expression with example.
4. List the algorithms of minimizing the DFA.
5. Construct a CFG for the language $L = \{an, bn\} n \geq 1$.
6. Define Pushdown Automata.
7. Explain acceptance of PDA with empty stack.
8. Define Instantaneous description of TM.
9. What you mean by universal TM?
10. Define reducibility.

PART - B (5 x 16 = 80 Marks)

11. (a) Prove $1^3 + 2^3 + \dots + n^3 = \frac{n^2(n+1)^2}{4}$ by Mathematical Inductions. (16)

Or

- (b) Show that a language L is accepted by some DFA if and only if L is accepted by some NFA. (16)
12. (a) Let r be a regular expression. Then prove that there exists a NFA with ϵ transition that accept $L(r)$. (16)
- Or
- (b) Construct a DFA with reduced state equivalent to the regular expression $10 + (0+1) 0^* 1$. (16)
13. (a) Construct a PDA accepting $\{a^n b^m a^n \mid m, n \geq 1\}$ by empty stack. (16)
- Or
- (b) Find a Grammar in CNF equivalent to $S \rightarrow aAbB, A \rightarrow aA \mid a, B \rightarrow bB \mid b$. (16)
14. (a) Design a TM to compute $f(m, n) = m * n \forall m, n \in N$. (16)
- Or
- (b) Explain how the multiple tracks in a Turing Machine can be used for testing given positive integer is a prime or not. (16)
15. (a) Show that halting problem of Turing Machine is undecidable. (16)
- Or
- (b) Explain in detail about class P and class NP with neat examples. (16)
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