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**Question Paper Code : 11147**

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2014.

Sixth Semester

Computer Science and Engineering

080230026 — THEORY OF COMPUTATION

(Regulation 2008)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List the differences between finite automata and turing machines.
2. Define enumerators.
3. Define accepting computation history.
4. Define an oracle turing machine.
5. What is asymptotic notation?
6. Define verifier.
7. Define space compelxity classes.
8. What is Boolean circuit?
9. What is alternating turing machine?
10. What is parallel computation?



PART B — (5 × 16 = 80 marks)

11. (a) (i) Design a turing machine which accepts the language  $c = \{a^i b^j c^k \mid i \times j = k \text{ and } i, j, k \geq 1\}$ . (8)
- (ii) Prove that every multitape turing machine has an equivalent single tape turing machine. (8)

Or

- (b) Prove that the halting problem is undecidable.

12. (a) Explain post correspondence problem in detail with an example.

Or

- (b) State and prove Recursion theorem.

13. (a) Prove that every context free language is a member of P.

Or

- (b) Prove that the Th  $(\mathbb{N}, +)$  is decidable.

14. (a) State and prove Savitch's theorem.

Or

- (b) State and prove time hierarchy theorem.

15. (a) Prove the statement  $\#SAT \in IP$ .

Or

- (b) Explain about cryptography in detail.
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