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Question Paper Code : 51134

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 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. What is Turing Machine?
2. What is meant by halting problem?
3. What is Mapping reducibility?
4. Define Turing reducible.
5. What is Time complexity?
6. Define class P and NP completeness.
7. What is Circuit complexity?
8. Define PSPACE and PSPACE-complete.
9. What is probabilistic algorithm?
10. Define Parallel computation.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Give implementation-level description of Turing machines that decide the following language over the alphabet $\{0,1\}$ {w/w contains an equal number of 0s and 1s}. (10)
(ii) Show that a language is Turing-recognizable if and only if some enumerators enumerates it. (6)
- Or
- (b) (i) Show that Halting Problem is undecidable. (10)
(ii) Prove that ANFA is decidable. (6)

12. (a) (i) Prove the theorem using reducibility concept: ETM is undecidable. (10)
(ii) Prove REGULARTM is undecidable. (6)

Or

- (b) (i) Prove the Recursive theorem. (8)
(ii) Show that MIN(TM) is not Turing-recognizable. (8)
13. (a) (i) Prove that every CFL is a member of P. (10)
(ii) Show that SUBSET-SUM is in NP. (6)

Or

- (b) Prove that HAMPATH is NP-complete. (16)
14. (a) Prove the Savitch's theorem. (16)

Or

- (b) Prove $IP = PSPACE$. (16)
15. (a) (i) Prove that NL is a subset of NC^2 . (8)
(ii) Prove that EQRPOB is in BPP. (8)

Or

- (b) Explain about Parallel computation. (16)