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Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, NOVEMBER 2013

IT/CS 09 506—THEORY OF COMPUTATION

Time : Three Hours

Maximum : 70 Marks

Part A

Answer **all** *questions.*

1. What is inductive proof ?
2. State pumping lemma for regular set.
3. Give formal definition of PDA.
4. Define ID and Move of a Turing machine.
5. What is undesirability ? Give example.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

1. Distinguish NFA and DFA with examples.
2. Construct a DFA over $\Sigma = (a, b)$ which produces not more than 3 a's.
3. Let S → aB/bA

   A → aS/bAA/a

   B → bS/aBB/b

   Derive the string aaabbabba as left most derivation.
4. Differentiate between recursive and recursively enumerable language.
5. Describe the undecidable problem about Turing machines.
6. Prove that CLIQUE is in NP.

(4 × 5 = 20 marks)

Part C

1. Construct the minimal DFA for the regular expression (b | a) * baa.

Or

2. Explain in detail with an example the conversion of NDFA to DFA.
3. What is deterministic PDA? Explain with an example.

Or

Turn over

4. Obtain a Greibach normal form grammar equivalent to the context free grammar :

   $S \rightarrow AA \mid 0$

   $A \rightarrow SS \mid 1$

5. Explain post correspondence problem with an example.

Or

6. Show there exists a TM for which the halting problem is unsolvable.

7. Explain the difference between tractable and intractable problems with examples.

Or

8. Prove that Hamiltonian circuit problem is NP-complete.

(4 × 10 = 40 marks)