FACULTY OF INFORMATICS
B.E. 3/4 (IT) I – Semester (Supplementary) Examination, July 2014

Subject : Theory of Automata

Time : 3 hours   Max. Marks : 75

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.
PART – A (25 Marks)

1	Define DFA and define language of DFA.	2
2	Distinguish between DFA and NFA.	2
3	State algebraic laws of regular expressions.	3
4	State pumping lemma for regular languages.	2
5	Given G = ({P}, {0, 1}, A, P). P → $\in$ | 0 | 1 | 0P0 | 1P1 |. Show that this grammar can produce palindromes. 'A' represents productions.	3
6	Define context free language. State simplifications that are needed to convert a CFL to Chomsky normal form.	3
7	For a Pushdown automation, distinguish between acceptance by final state and acceptance by Empty stack.	3
8	When does a turing machine halt?	2
9	Distinguish between recursively enumerable languages and recursive languages.	3
10	What is an intractable problem? Give an example.	2

PART – B (50 Marks)

11	Construct DFA for the two-disk Towers-of-Hanoi problem showing the details in terms of state transition diagram, and give the language of this DFA.	10
12	State and explain subset construction method.	10
13	Write the algorithm for minimizing a DFA, and illustrate.	10
14	State pumping lemma for CFLs. State and explain the approaches that apply the productions of a CFG to infer that certain strings are in the language of a certain variable.	10
15	Define DPDA. Illustrate the deterministic PDA given below accepting the string 0011 from $\{0^n 1^n \mid n > 1\}$. Start from the left-most symbol in the string.	10
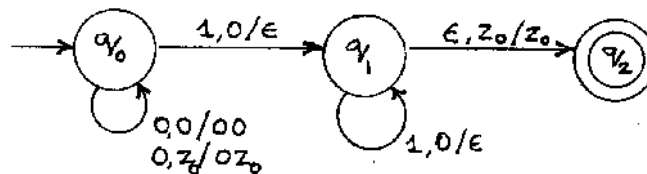
What is the stack content on acceptance.

16	Explain Halting, acceptance and Languages of a turning machine with suitable examples.	10
17	Explain reduction and post's correspondence problem with an example. How is PCP an important example of an undecidable problem.	10
18	Write notes on NP and NP-complete problems in relation to nondeterministic turing machines.	10

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