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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST-3 EXAMINATION- December, 2018

M. Tech III Semester

COURSE CODE: 15M1WCI331 MAX. MARKS: 35

COURSE NAME: Advanced Theory of Computation

COURSE CREDITS: 3 MAX. TIME: 120 Minutes

Note: *All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.*

Q1. Definition of a language L with alphabet {a} is given as following. L= { a^{nk} | k > 0, and n is a positive integer constant} What is the minimum number of states needed in a DFA to recognize L? (3) (CO1)

Q2. Construct PushDown Automata for L={$0^n1^m2^m3^n$}. Trace the acceptance of the following string by this PDA : 00011112222333. (4) (CO2)

Q3. Which of the following problems are decidable? Support your answer with appropriate explanation. (6) (CO 5)

1) Does a given program ever produce an output?
2) If L is a context-free language, then is L' (complement of L) also context-free?
3) If L is a regular language, then is L' also regular?
4) If L is a recursive language, then, is L' also recursive?

Q4. Does the PCP with two lists x=(b,bab^3,ba) and y=(b^3,ba,a) have a solution? (3) (CO 5)

Q5. Describe the class of languages accepted by different machines in Automata theory. Draw a Venn Diagram also for the same. (7) (CO6)

Q6. Draw a TM for subtraction operation. eg. (3-4) or (4-3) (6) (CO6)

Q7. What are NP, P, NP-complete and NP-Hard problems? (6) (CO7)