ARVIND KUMAR

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
End Sem. Exam (summer)
B.Tech. (3rd Year)

COURSE CODE: 10B11CI513
COURSE NAME: Theory of Computation
COURSE CREDITS: 4

MAX. MARKS: 50
MAX.TIME: 2Hr

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1. (a) Consider a CFG G = ({S,A,B,0,1,2,3}, {0,1,2,3}, R, S) with the production set R as follows: [5 +5]

S → 0S0 | 1S1 | A

A → 2B3

B → 23 | 31

Design a PDA Machine M corresponding to the CFG G and show that the string 01223310 is accepted by M using transition functions obtained.

(b) Explain clearly the Push down Automaton (PDA) Machine in terms of its tuples. [5]

(c) Design a PDA Machine to accept the language L= $\{0^n1^{n+2} \mid n>=1\}$. Write down the applications of Context Free Languages. [6+4]

2. (a) Which of the following could be a configuration for a Turing Machine? Justify your answers.

(i) $(q, \triangleright a \sqcup aU, \sqcup, \sqcup a)$
(ii) (q, abc, b, abc)
(iii) $(q, \triangleright a \sqcup ab, b, \sqcup aaU)$
(iv) $(p, \triangleright a, ab, \sqcup a)$ [2 x 4 =8]

(b) Explain clearly a Turing machine in terms of its tuples. Do the machines LR and RL always accomplish the same thing? Explain. [4+3]

(c) In the definition of a Turing machine, we allow rewriting a tape square without moving the head and moving the head left or right without rewriting the tape square. What would happen if we also allow leaving the head stationary without rewriting the tape square? [4]

(d) Design a Turing machine that shifts its input two characters to the right. (Assume w ε{a,b}*). [6]