JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

Make-up Examination-Nov-2025

COURSE CODE (CREDITS): 25B11CI315 (3) MAX. MARKS: 25

COURSE NAME: Theory of Computation

COURSE INSTRUCTORS: ARV*, MNK, NSA, RMS, SKS, SMA MAX. TIME: 1 Hr 30 Min.

Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q.No	Question	CO	Marks
Q1	Consider the following grammar (the start symbol is S; the alphabets are implicit in the rules): $S \rightarrow SS \mid AAA \mid \varepsilon$ $A \rightarrow aA \mid Aa \mid b$ (a) Describe the language generated by this grammar. (b) Give a left-most derivation for the terminal string abbaba. (c) Show that the grammar is ambiguous by exhibiting two distinct derivation trees for some terminal string	3	5
Q2	Construct a Context Free Grammar for the language given below: $L = \{a^m b^{2n} c^{3n} d^p \mid p > m$, and $m, n \geq 1\}$	3	5
Q3	Simplify the following context free grammars $S \rightarrow ABaC$, $A \rightarrow BC$, $B \rightarrow b \mid \varepsilon$, $C \rightarrow D \mid \varepsilon$, $D \rightarrow d$	3	5
Q4	Convert the following grammar to CNF $S \rightarrow AACD$ $A \rightarrow aAb \mid \varepsilon$ $C \rightarrow aC \mid a$ $D \rightarrow aDa \mid bDb \mid \varepsilon$	3	5
Q5	Prove that the following language $L = \{a^k b^k : k >= 1\}$ ig generated by Type 2 grammar.	3	5

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