MANAV RACHNA vidyanjali trust

MANAV RACHNA UNIVERSITY
FORMERLY MANAV RACHNA COLLEGE OF ENGINEERING
NAAC ACCREDITED 'A' GRADE INSTITUTION
Declared as State Private University under Sec. 2(f) of the UGC Act, 1956

DEPARTMENT OF COMPUTER SCIENCE & TECHNOLOGY

"T2 Examination, March-2019"

Semester: IV
Subject: THEORY OF COMPUTATION & COMPILER DESIGN
Branch: CSE
Course Type: Core
Time: 90 Minutes
Program: B.Tech

Date of Exam: 11/03/2019
Subject Code: CSH209-T
Session: II
Course Nature: Hard
Max.Marks:30
Signature: HOD/Associate HOD:

Note: Part A: All questions are compulsory. Each Question carries 2 marks.
Part B: Attempt any two questions. Each Question carries 10 marks.

PART-A

Q1. (a) State whether the following statements are true or false. Justify your answer with a proof.
(i) If L is a finite subset of Σ^*, then L is a context-free language.
(ii) If L is a finite subset of Σ^*, then L is a regular language.
(b) (i) What are the different defects in context free grammar.
(ii) If each production in a grammar G has some variable on its right-hand side, what can you say about L (G)?
(c) Show that the grammar $S \rightarrow aB \mid ab$, $A \rightarrow aAB \mid a$, $B \rightarrow Bb \mid b$ is ambiguous for string w = aaabbb
(d) Explain the Chomsky hierarchy.
(e) Show that $G_1 = [\{S\}, \{0, 1\}, \{S \rightarrow 0S1 \mid 01\}, S]$ is equivalent to $G_2 = [\{S, A, B, C\}, \{0, 1\}, \{S \rightarrow AC \mid AB, C \rightarrow SB, A \rightarrow 0, B \rightarrow 1\}, S]$.

PART-B

Q2. (a) Consider a language $L = \{wcw^R \mid w \in (a, b)^*\}$.
(i) To design a push down automata that accepts the palindrome language.
(ii) To design a transition state diagram for this language.
(iii) To check acceptability for any one string that has length 5.
(b) Consider a grammar $G = [[\{S, A\}, \{0, 1\}, \{S \rightarrow 0A0, A \rightarrow 0A0 \mid 1], S]$. Find language.

Q3. (a) Consider a grammar G = $[\{S, A, B, C, D, E\}, \{0, 1\}, \{S \rightarrow AB, C \rightarrow D, D \rightarrow E, A \rightarrow 0, B \rightarrow 1 \mid C, E \rightarrow 0\}, S]$. Eliminate unit production and get an equivalent grammar.
(b) Consider a grammar $G = [\{S, A, B\}, \{a, b\}, \{S \rightarrow AB, A \rightarrow BS \mid b, B \rightarrow SA \mid a\}, S]$. Find a grammar in GNF equivalent to G

Q4. (a) Find a grammar in CNF equivalent to $X \rightarrow aYbZ$, $Y \rightarrow aY \mid a$, $Z \rightarrow bZ \mid b$
(b) The following grammar generates prefix expressions (E) with operands x and y and binary operators +, - , and *:

$E \rightarrow +EE \mid *EE \mid -EE \mid x \mid y$

(i) Design a Derivation tree for the string **+*-xyxy**.
(ii) Prove that this grammar is unambiguous.

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