VIT UNIVERSITY
(Estd. u/s 3 of UGC Act 1956)

SCHOOL OF INFORMATION TECHNOLOGY AND ENGINEERING

CAT II – B.Tech (IT)- Fall Semester - 2019

Course Name Theory of Computation — **Duration:** 90 MINUTES

Course Code: ITE1006 — **Max. Marks :** 50

Slot : B1+ TB1

Faculty : R. Raghavan

PART A (5 x 10 = 50 marks)

ANSWER ALL THE QUESTIONS

1. Construct context free grammars to accept the following languages for $\Sigma = \{0, 1\}$
   a) $\{0^n1^n \mid n>0\} \cup \{0^n1^{2n} \mid n>0\}$ — 5 marks
   b) $\{0^i1^j2^k \mid i \neq j \text{ or } j \neq k\}$ — 5 marks

2. Convert the following Context Free Grammar to Chomsky Normal Form

   $S \rightarrow ASB \mid \varepsilon$
   $A \rightarrow aAS \mid a$
   $B \rightarrow SbS \mid A \mid bb$

3. In a context free grammar assume $V_N = \{S,A,B\}$, $\sum = \{a,b\}$, $w_1 = ababba \in L(G)$ but $w_2 = baaababba \notin L(G)$. Support your CFG productions which match to the above assumption. Also give the corresponding parse tree representation.

4. Convert the following Context Free Grammar in to Greibach Normal Form

   $S \rightarrow A$
   $A \rightarrow aBa \mid a$
   $B \rightarrow bAb \mid b$

5. a) Consider the following Context Free Grammar (5 marks)

   $S \rightarrow A1B$
   $A \rightarrow 0A \mid \wedge$
   $B \rightarrow 0B \mid 1B \mid \wedge$
   Give Parse trees for the strings 00101, 1001, 0001.

   b) Construct productions of CFG for the following regular expression (5 marks)

   $0^*1(0+1)^*$
