Registration no: | | | | | | | | | | |

Total Number of Pages: 02 **BTECH**
PECS5304

5th Semester Regular / Back Examination 2016-17

THEORY OF COMPUTATION

BRANCH(S): BIOTECH, CSE, IT, ITE

Time: 3 Hours

Max Marks: 70

Q.CODE: Y304

Answer Question No.1 which is compulsory and any five from the rest.

The figures in the right hand margin indicate marks.

Q1 **Answer the following questions:** **(2 x 10)**

a) Define the PDA with its tuple specifications.

b) Design an NFA which accepts set of all strings with two consecutive zero's.

c) What is the difference between DFA and NFA?

d) What do you mean by a decidable problem?

e) Define NFA mathematically. Design an NFA intuitively which accepts set of all strings containing 3rd symbol from right side is 1.

f) Discuss the Chomsky's Hirerchy of Grammars with examples.

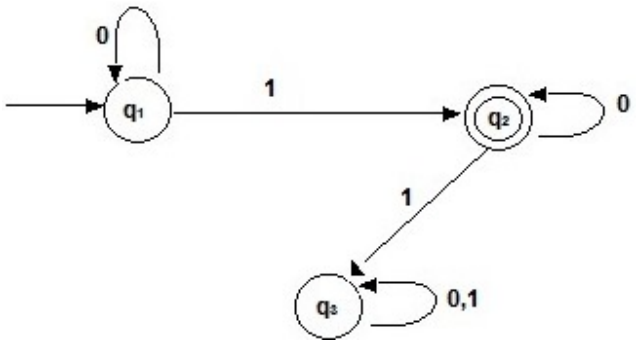
g) State Church-Turing hypothesis.

h) Define TM with its tuple specifications

i) What is a Context Sensitive Grammar? Define in brief with an example.

j) Define non-deterministic PDA.

Q2 **a)** Derive the regular expression for the given DFA **(5)**



b) Construct the PDA for the following grammar **(5)**

S->aA
A->aABD|bB|a
B->b
D->d

Q3 **a)** Discuss the importance of pumping lemma with an example. **(5)**

b) Reduce the following grammar into CNF **(5)**

S→ aAD
A→ aB | bAB
B → b
D → d

Q4 Explain in detail with an example the conversion of NFA to minimized DFA for the by constructing NFA for the regular expression abb $(a|b)^*$. **(10)**

Q5 **a)** Compute the Godel number for the following sequence: **(5)**

i. 2,0,1 ii. 3,0,0,1 iii. 2,0,3,0 iv. 0,1,1

b) What is an Ackerman's function? By defining the Ackerman's function find out the values of **(5)**

i. A (1,2) ii. A (3,3)

Q6 **a)** Design a PDA to accept L={w|w $(a,b)^*$} such that **(5)**

i. $n_a(w) > n_b(w)$

ii. $n_a(w) < n_b(w)$

Where $n_a(w)$ and $n_b(w)$ represent number of a's and number of b's respectively.

b) Construct a context free grammar to generate the set of all balanced parentheses over the alphabet $\sum$= {(,)} and then design the PDA accepting L of this CFG by empty stack. **(5)**

Q7 **a)** Construct a Turing Machine over alphabet {0,1} that contains set of strings of 0's and 1's except those containing the substring 001. **(5)**

b) Design a TM to accept the language L(M)={$a^n b^n c^n$| n>=1} **(5)**

Q8 **Write short notes on (any two) the following:** **(5 x 2)**

a) Complexity class P vs NP

b) CYK Algorithm

c) Post's Correspondence problem

d) NFA vs PDA