SF-221

Seat No.	

Total No. of Pages : 3

S.E. (Computer Science and Engineering) (Semester - IV) Examination, November - 2017
AUTOMATA THEORY
Sub. Code : 63531

Day and Date : Wednesday, 01 - 11 - 2017 **Total Marks : 50**
Time : 9.30 a.m. to 11.30 a.m.

Instructions :
1) **Question no. 1 and 4 are compulsory.**
2) **Solve any one question out of question no. 2 and 3.**
3) **Solve any one question out of question no. 5 and 6.**
4) **Assume suitable data wherever necessary.**
5) **Figures to the right indicate full marks.**

Q1) Solve any three questions : **[15]**

a) Design a DFA for language over $\sum=\{0,1\}$ and string containing substring "0110".

b) What is context free Languages (CFL)?

c) Describe nondeterministic finite automata with Λ transition & recursive definition for extended transition function for NFA - Λ.

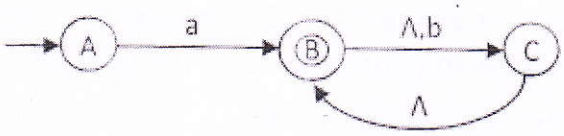
d) Convert the following grammar to its Chomsky Normal form.

$S \rightarrow bA|aB$

$A \rightarrow bAA|aS|a$

$B \rightarrow aBB|b$

Q2) a) Obtain NFA from following NFA - Λ. **[4]**



P.T.O.

b) If L1 = {x|00 is not a substring of x} and L2 = {x | x ends with 01}, Design a DFA for L1 – L2. **[6]**

Q3) a) Describe Top-down parsing. **[4]**

b) NFA with states 1-5 & input alphabet {a, b} has the following transition table. **[6]**

State (q)	δ(q, a)	δ(q, b)
1	{1, 2}	{1}
2	{3}	{3}
3	{4}	{4}
4	{5}	-
5	-	{5}

i) Draw a DFA.

ii) Calculate δ* (1, ab).

iii) Calculate δ* (1, abaab).

Q4) Solve any three questions : **[15]**

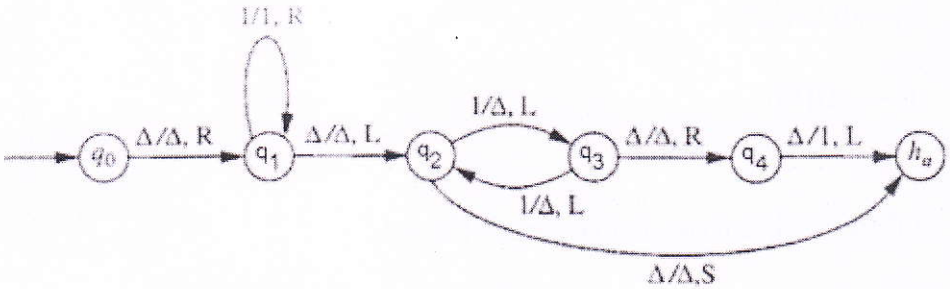
a) Define following terms :

i) Computation of partial function using Turing Machine.

ii) Acceptance of a string by PDA.

b) Prove Pumping Lemma for Context Free Language.

c) For following Turing machine :



Trace moves from q_0 state for string "11111" on tape and comment on the result on the tape when the machine enters in the h_a state.

d) Desing PDA for L = {$a^m b^n$ | m > n and n > 0}.

Q5) a) Design PDA for $L = \{a^i b^j c^k \mid k = i + j \text{ and } i, j > 0\}$. **[6]**

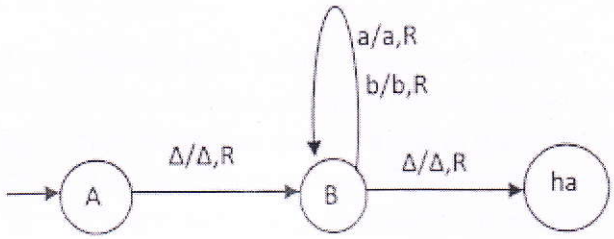
b) Design Top-down PDA for following Grammar : **[4]**

$S \rightarrow AB$

$A \rightarrow aA \mid a$

$B \rightarrow bB \mid b$

Q6) a) Give Encoding of following Turing Machine : **[7]**



b) Define Turing Machine. **[3]**