Seat No.	

SL-461

Total No. of Pages : 2

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

Day and Date : Tuesday, 25-04-2017
Time : 9.00 a.m. to 11.00 a.m.

Total Marks : 50

Instructions :
1) Q. No.1 & Q.No.4 are compulsory.
2) Solve any one questions No.2 & question No.3.
3) Solve any one question No.5 & question No.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 $\sum = \{a,b\}$ and strings containing substring "babab".

b) What is a Regular Language? Write any two examples of regular expression and associated strings in that language.

c) Describe Nondeterministic Finite Automata with $\wedge$ transitions giving suitable example.

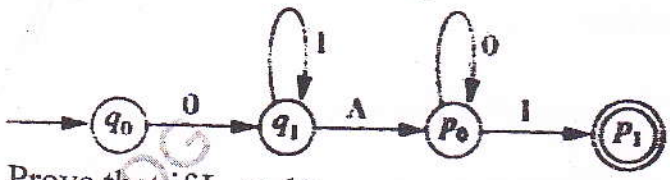
d) Convert the following grammar to its Chomsky Normal Form.

$S \rightarrow bA|aB$

$A \rightarrow bAA|aS|a$

$B \rightarrow aBB|b$

Q2) a) Obtain NFA from following NFA-$\wedge$ **[4]**

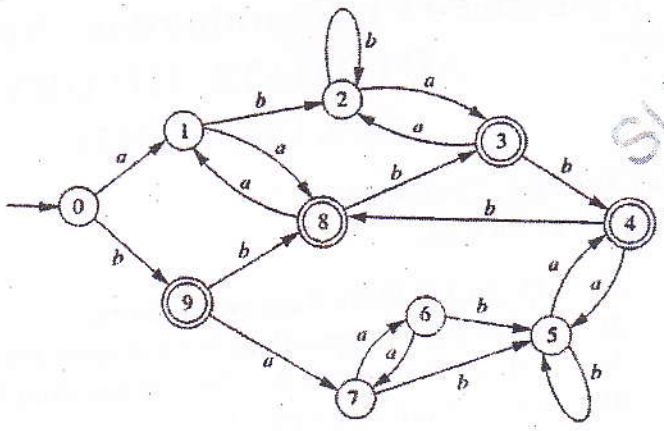


b) Prove that if L_1 and L_2 are context free languages, then $L_1 U L_2$ and * are also Context free Languages. **[6]**

P.T.O.

Q3) a) Describe recursive descent parsing. [4]

b) Find a minimum-state FA for the following FA. [6]



Q4) Solve any three questions: [15]

a) Draw PDA for following language:
$L=\{XcX^R \mid X \in \{a,b\}^*\}$

b) Write the proof of pumping Lemma for Context-Free Languages.

c) Draw Turing Machine for following language:
$L=\{X \mid X \in \{a,b\}^*$ and length of string X is even$\}$

d) Write short note on "Universal Turing Machine".

Q5) a) Write moves for a Top-down PDA for following CFG [6]
$S \rightarrow a \mid aS \mid bSS \mid SbS \mid SSb$

b) Define following terms: [4]

i) PDA

ii) Acceptance of a string by a PDA.

Q6) a) Define Computation of a function using Turing Machine. Draw Turing Machine to compute 'remainder mod 2". [7]

b) Describe Turing Machine. [3]

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SUK-SDG