

- N.B. (1) Question No. 1 is compulsory  
(2) Attempt any three out of remaining five questions  
(3) Assumptions made should be clearly stated
- (a) Write short note on Myhill Nerode theorem 5  
(b) Differentiate between NFA and DFA. 5  
(c) State and explain Closure properties of Context Free Language 5  
(d) Explain Post Correspondence problem. 5
  - (a) Construct the NFA- $\epsilon$   
i for the language in which strings starts and ends different letter over the set  $\Sigma = \{a, b\}$   
ii for the R.E  $(01+2^*)$  10  
(b) Give and Explain formal definition of Pumping Lemma for Regular Language and prove that following language is not regular. 10  
$$L = \{ a^n b^m \mid 1 \leq n \leq m \}$$
  - (a) Convert the given grammar into Griebach Normal Form 10  
$$S \rightarrow aSB \mid aA$$
$$A \rightarrow Aa \mid Sa \mid a$$
  
(b) Construct PDA for a language  $L = \{wcw^R \mid w \in \{a,b\}^*$  and  $w^R$  is reverse of  $w\}$  10
  - (a) Construct TM to check palindrome over  $\Sigma = \{0,1\}$  10  
(b) Design a DFA which accepts all strings not having more than 2 a's over  $\Sigma = \{a, b\}$  10
  - (a) Convert  $(0+1)(01)^*(0+\epsilon)$  into NFA with  $\epsilon$ -moves and obtain DFA. 10  
(b) Design Mealy Machine that accepts an input from  $(0+1)^*$  if the input ends in 101, output A; if the input ends in 110, output B, otherwise C. then convert into Moore Machine. 10
  - (a) Draw a parse tree for the string "abaaba" for the CFG given by G where 10  
$$P = \{ S \rightarrow aSa$$
$$S \rightarrow bSb$$
$$S \rightarrow a \mid b \mid \epsilon \}$$
  
Also Determine whether the given CFG is ambiguous or not.  
(b) Write short note on following 10  
i) Halting problem  
ii) Rice's Theorem