(3 Hours) **[Total Marks : 80]**

N.B. (1)Question No. 1 is compulsory
(2) Attempt any three out of remaining five questions
(3) Assumptions made should be clearly stated

1. (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
2. (a) Construct the NFA-**ϵ**
   i for the language in which strings starts and ends different letter over the set ∑ = { 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
   $L=\{ a^n b^m \mid 1<=n<=m \}$
3. (a) Convert the given grammar into Griebach Normal Form 10
   S -> aSB| aA
   A -> Aa | Sa | a
   (b) Construct PDA for a language $L=\{wcw^R \mid w \varepsilon \{a,b\}$ and w^R is reverse of w} 10
4. (a) Construct TM to check palindrome over **Σ**={0,1} 10
   (b) Design a DFA which accepts all strings not having more than 2 a's over ∑={a, b} 10
5. (a) Convert (0+1) $(01)^*$(0+∈) into NFA with ε-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
6. (a) Draw a parse tree for the string "abaaba" for the CFG given by G where 10
   P= { S-> aSa
   S -> bSb
   S -> a |b |**ε**}.
   Also Determine whether the given CFG is ambiguous or not.
   (b) Write short note on following 10
   i) Halting problem
   ii) Rice's Theorem
