

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- $\epsilon$  10
  - i for the language in which strings starts and ends different letter over the set  $\Sigma = \{a, b\}$
  - ii) for the R.E  $(01+2^*)$
- (b) Give and Explain formal definition of Pumping Lemma for Regular Language and prove that following language is not regular. 10

$$L = \{ a^n b^m \mid 1 \leq n \leq m \}$$
3. (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
4. (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
5. (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
6. (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