

(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  
(4) Figures to the right indicate full marks  
(5) Assume suitable data whenever required but justify that.

[ Total Marks : 80

- Q.1 (a) Differentiate between NFA and DFA [5M]  
(b) State and Explain closure properties of Context Free Language [5M]  
(c) Explain with an example the Chomsky hierarchy [5M]  
(d) Compare recursive and recursively enumerable languages. [5M]
- Q.2 (a) Construct PDA accepting the language  $L = \{a^n b^n \mid n > 0\}$  [10M]  
(b) Design minimized DFA for accepting strings ending with 100 over alphabet  $(0,1)$ . [10M]
- Q.3 (a) Convert  $(0+\epsilon)(10)^*(\epsilon+1)$  into NFA with  $\epsilon$ -moves and obtain DFA [10M]  
(b) Construct Turing machine that accepts the string over  $\Sigma = \{0,1\}$  and converts every occurrence of 111 to 101. [10M]
- Q.4 (a) Convert following Grammar to CNF and GNF [10M]  
 $S \rightarrow ASB/a/bb$   
 $A \rightarrow aSA/a$   
 $B \rightarrow SbS/bb$   
(b) Design PDA to accept language  $L = \{a^{n-1} b^{2n+1} \mid n \geq 1\}$  [10M]
- Q.5 (a) Design Moore Machine to generate output A if string is ending with abb, B if string ending with aba and C otherwise over alphabet  $(a,b)$ . And Convert it to Mealy machine. [10M]  
(b) Construct TM to check wellformed ness of parenthesis [10M]
- Q.6 Write short notes on [20M]  
(a) Rice theorem  
(b) Variant of TM  
(c) Applications of Regular Expression  
(d) Difference between PDA and NPDA