



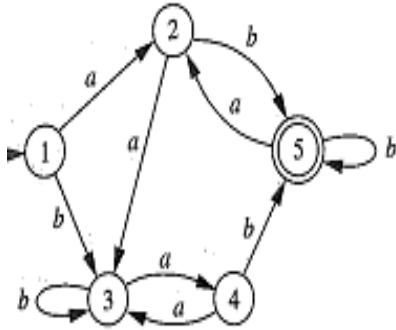
- b) Define the Strong Principle of Mathematical Induction. Prove the following using mathematical Induction.  
 $7 + 13 + 19 + \dots + (6n+1) = n(3n+4)$

**Q-4 Attempt all questions (14)**

- a) (i) Draw FA for  $(a + b)^*baaa$ .  
(ii) Write a Regular Expression for the String of 0's and 1's in which number of 0's and 1's are even.
- b) Let L be the language corresponding to the regular expression  $(011+1)^*(01)^*$ . Find the CFG generating L.

**Q-5 Attempt all questions (14)**

- a) Check whether the given grammar is in CNF  
 $S \rightarrow bA|aB$   
 $A \rightarrow bAA|aS|a$   
 $B \rightarrow aBB|bS|b$   
If it is not in CNF, Find the equivalent CNF.
- b) For following NFA find minimum FA accepting same language.



**Q-6 Attempt all questions (14)**

- a) Draw PDA accepting strings of Brackets like following.  
 $S \rightarrow SS | \{S\} | [S] | \Lambda$
- b) What is pumping lemma? Use the pumping lemma to show that the following language is not regular:  
 $L = \{xy \mid x,y \text{ is } \{0,1\}^* \text{ and } y \text{ is either } x \text{ or } x^r\}$

**Q-7 Attempt all questions (14)**

- a) State and prove Arden's Theorem.
- b) Explain ambiguity in the CFG with the example of the "Dangling Else". Also write down the unambiguous grammar for the "Dangling Else".

**Q-8 Attempt all questions (14)**

- a) Explain Polynomial Time Reductions and NP- Completeness.
- b) Draw TM for accepting Palindrome Strings in  $\{a,b\}^*$ .

