

(3 Hours)

[Total Marks: 80]

Note :

1. Question No.1 is compulsory.
2. Attempt any three question from remaining question.
3. Draw suitable diagram whenever necessary.

Q.1:

- a) Construct NFA for accepting binary string in which the first part of each string contain at least four 0's and second part contains at least three 1's (05)
- b) State and explain limitations and power of Finite Automata. (05)
- c) Design a Moore machine for binary number divisible by 3 (05)
- d) Construct a FA to search the keyword 101 for String over $\{0,1\}$. (05)

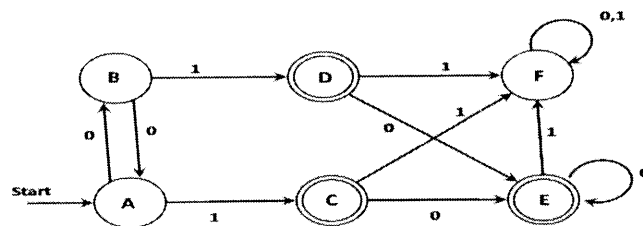
Q2. a) Convert the following grammar to CNF (10)

 $S \rightarrow Ba / aB$ $A \rightarrow bAA / aS / a$ $B \rightarrow aBB / bS / b$

- b) Design a Moore machine that will read sequences made up of letters A,E,I,O,U and will give an output having the same sequences. Except that in those cases where and 'I' directly follows and 'E', it will be changed to 'U'. (10)

Q.3:

- a) Minimize the following DFA .



- b) Convert the following NFA to DFA(final state is marked with *) (10)

δ	0	1
p	p,q	p
q	r	r
r	s	---
*s	s	s

Q.4:

- a) Design PDA for recognizing $L = \{ a^n b^m a^n \mid m, n \geq 1 \}$ (10)
- b) Using pumping lemma prove that the languages of all even palindromes over an alphabet $\{a,b\}$ is non regular (10)

Q.6: Write a Short Note on (any four)

- a) Chomsky Hierarchy.
 - b) Applications of Automata theory
 - c) Pumping Lemma for regular languages.
 - d) Simplification of CFG.
 - e) Variation of Turing Machine.
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(20)