

BT-5/D11 : 7703

CSE-305 : Automata Theory

Maximum Marks : 100

Three Hours
Attempt any 5 question

SECTION-A

a) Show that the regular expression $(a+b)^* a(a+b)^* b(a+b)^*$ is equivalent to $(a+b)^* ab(a+b)^*$ in the sense that they define the same language. 10

b) Prove that

$$i) \lambda + 1^*(011)^* (1^*(011)^*)^* = (1+011)^*$$

$$ii) (1+00^*1) + (1+00^*1) (0+10^*1)^* \\ (0+10^*1) = 0^*1(0+10^*1)^*$$

$$iii) 10+(1010)^* [\lambda^* + \lambda(1010)^*] = 10 + \\ (1010)^* \quad 3+3+4=10$$

1) Write all differences between deterministic & non-deterministic finite automata. 8

2) Find the language generated by the grammar 6

$$S \rightarrow AB, A \rightarrow A1/0, B \rightarrow 2B/3$$

Contd.

c) Construct a DFA equivalent to regular expression $ba + (a+bb) a^*b$ Q.6

Q.3. a) Design a FSM with minimum states which accepts all strings over $\{a, b\}$ such that number of a's is divisible by 2 & numbers of b's is divisible by 3.

b) How a NFA is converted to DFA? Give examples & explain.

Q.4 a) Find a CFG that generates the following languages over alphabet $\Sigma = \{a, b\}$

- i) All strings that end in b and have even number of b's in total
- ii) All strings of odd length

b) Convert the given grammar into GNF
 $S \rightarrow AB, A \rightarrow BS/b, B \rightarrow SA/a$ Q.7

Q.5 a) Construct a PDA named A equivalent to following context free grammar $S \rightarrow OBB, B \rightarrow OS/IS/O$ Test whether 010^4 is in $N(A)$. Q.8

b) Construct a PDA accepting the set of all even length palindromes over $\{a, b\}$ by empty stack