

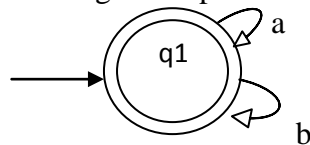
“Please check whether you have got the right question paper.”

- i) Q. No. 1 and Q. No. 6 are compulsory.
- ii) Attempt any two question from Q. No. 2 to Q. No. 5 and from Q. No. 7 to Q. No. 10 of each section.
- iii) Figures to right indicates full marks.

SECTION-A

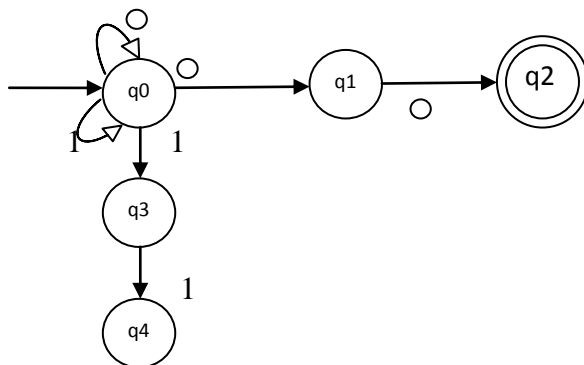
Q.1 Attempt any five from the following. 10

- 1) Define NFA with suitable example.
- 2) Define Moore and mealy machine.
- 3) Determine the regular expression or language given by following FA



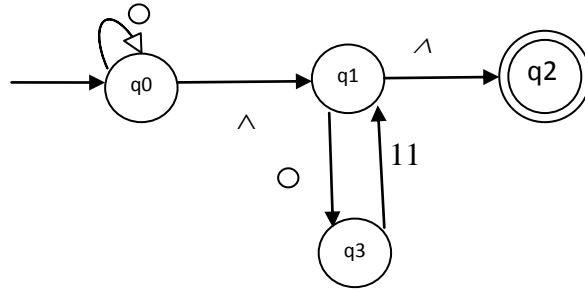
- 4) obtain the transition table and state transition diagram for the following FA
 $M = (\{q_0, q_1, q_2, q_3\}, \{a, b\}, \delta, q_0, \{q_0\})$
 $\delta(q_0, a) = q_2, \delta(q_0, b) = q_1$
 $\delta(q_1, a) = q_3, \delta(q_1, b) = q_0$
 $\delta(q_2, a) = q_0, \delta(q_2, b) = q_3$
 $\delta(q_3, a) = q_1, \delta(q_3, b) = q_2$
- 5) Find the regular expression for set of strings over $\{0, 1\}^*$ with exactly two 0's.
- 6) Define ambiguous grammar with an example.
- 7) Define CFG. What is the meaning of context free?
- 8) Define alphabet and string in the concept of finite automate.

Q.2 a) Given the NFA shown below, determine the equivalent DFA. 08



b) Convert the given NFA with epsilon transition to NFA without epsilon transition.

07



Q.3 a) Construct minimum state DFA equivalent to the following automation.

08

States/ Σ	A	b
q0	q1	q0
q1	q0	q2
q2	q3	q1
q3	q3	q0
q4	q3	q5
q5	q6	q4
q6	q5	q6
q7	q6	q3

b) Consider the grammar given below, $S \rightarrow S b S/a$ for the string abababa, find

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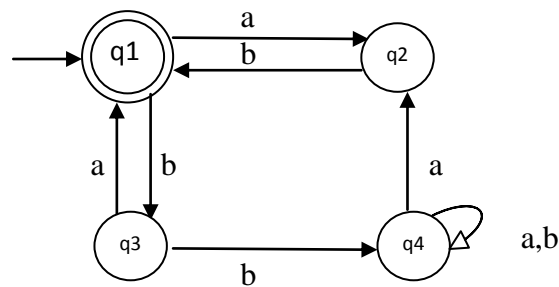
- 1) Parse tree
- 2) Left most derivation
- 3) Rightmost derivation.

Q.4 a) Construct PDA A accepting set of all strings over $\{a, b\}^*$ with equal number of a's and b's.

08

b) Using ardeus theorem, find regular expression for the given FA.

07



Q.5 Write short notes on

15

- 1) Automata and complexity
- 2) Algebraic laws for RE
- 3) Pumping lemma for regular language.

SECTION-B

- Q.6 Attempt any five from the following 10
- 1) Explain the component of PDA with neat diagram.
 - 2) What are the special features of TM?
 - 3) Compare NPDA and DPDA.
 - 4) What is the main application of pumping lemma in CFL?
 - 5) Explain the two normal forms for the grammar.
 - 6) Define the acceptance of string using PDA.
 - 7) State the application of TM.
 - 8) Eliminate unit production from the following grammar & rewrite grammar
 $S \rightarrow AB$
 $A \rightarrow a$
 $B \rightarrow D/b$
 $D \rightarrow E$
 $E \rightarrow a$
- Q.7 a) Construct CFG equivalent to the given PDA. $P=(q, \{0, 1\}^* \{Z, A, B\}, \delta, q, z, \emptyset)$. δ is given by, 08
- $\delta(q, 0, z) = (q, A z)$
 $\delta(q, 1, z) = (q, B z)$
 $\delta(q, 0, A) = (q, AA)$
 $\delta(q, 0, B) = (q, \wedge)$
 $\delta(q, 1, A) = (q, \wedge)$
 $\delta(q, 1, B) = (q, BB)$
 $\delta(q, \wedge, Z) = (q, \wedge)$
- b) Consider the grammar below, 07
- $S \rightarrow AA/a$
- $A \rightarrow SS/b$
- Convert into GNF.
- Q.8 a) Design a Turing machine to recognize all string of odd number of 1's $\epsilon = \{1\}$. 08
- b) Show that $L = \{a^p / P \text{ is prime}\}$ 07
- Q.9 a) Explain halting problem of TM with suitable diagram. 08
- b) Explain linear Bounded automata in detail with suitable diagram. 07
- Q.10 Write short notes on 15
- 1) Universal TM
 - 2) Decision problem in CFL
 - 3) Deterministic PDA.