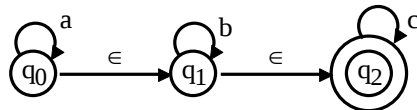




- Notes :
1. All questions carry equal marks.
 2. Assume suitable data wherever necessary.
 3. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) What is Deterministic finite automata. Design a DFA for the language given by $L = \{ \text{any strings which ends with aa over } \{a, b\} \}$ 8

- b) Convert given NFA – E to NFA without E. 8

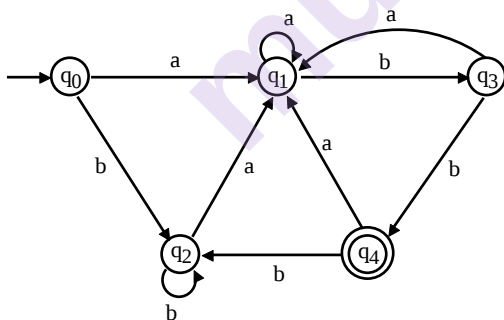
**OR**

2. a) Let $M = (\{q_0, q_1\}, \{0, 1\}, \delta, q_0, \{q_1\})$ be NFA Where δ is 8

δ	0	1
q_0	$\{q_0, q_1\}$	q_1
q_1	ϕ	$\{q_0, q_1\}$

construct equivalent DFA.

- b) Construct a minimum state automata for following DFA. 8

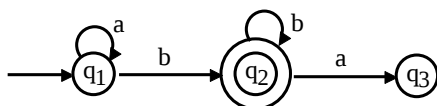


3. a) Convert Regular Grammar into Regular expression. 8
 $A \rightarrow_0 C / 1B / \epsilon$

$B \rightarrow_0 A$

$C \rightarrow_1 A$

- b) Construct regular expression for a given finite automata. 8

**OR**

4. a) Describe pumping lemma for a regular language with example. 8
 $L = \{a^P \mid P \text{ is prime}\}$
- b) Design a NFA- ϵ from given regular expression. 8
 i) $10 + (0 + 11)0^*1$
 ii) $(00 + 11)(0 + 1)^*$
5. a) For a given grammar, derive the following string "aabb" using leftmost and right most derivation. 8
- b) Design push down automata for the given language. 8
 $L = \{a^n b^n \mid n \geq 1\}$

OR

6. a) Design PDA for the language. 8
 $L = \{WCW^R \mid W \in \{0,1\}^*\}$
- b) What is push down Automata? How do PDA differ From DFAs and NFAs? 8
7. a) Design Turing Machine for addition. 8
 $f(x,y) = x + y$, x, y are integers.
- b) Define Turing Machine construct TM for the 2's complement. 8

OR

8. a) Convert following grammar into CNF 8
 $S \rightarrow aaaaS / aaaa$
- b) Consider CFG given below for eliminating ϵ - productions. 8
 $S \rightarrow a / Ab / aBa$
 $A \rightarrow b / \epsilon$
 $B \rightarrow b / A$
9. a) Define the term with an example. 8
 i) Recursive Language.
 ii) Recursively enumerable Language.
- b) Write and explain programming Techniques for Turing Machine. 8

OR

10. a) Explain P and NP class. 8
- b) Describe Chomsky Hierarchy. 8
