

Sec-1. Ans. 2

Sol  $\rightarrow$  i) In the list  $\{0, 10, 110, 111\}$  no codeword is prefix of another, so it is uniquely decodable.

ii) In the list  $\{1, 10, 110, 111\}$ , the codeword 1 is prefix to 10 with dangling suffix 0, 1 is prefix to 110 with dangling suffix 10 and 1 is also prefix to 111 with dangling suffix 11. Now add all the suffix to the list.  $\{1, 10, 110, 111, 0, 10, 11\}$  here we can see, that the codeword 10 is already ~~codeword~~ present in the list, so, it is not a uniquely decodable.

## Prefix Code $\Rightarrow$

A code  $C$  is a prefix code if no codeword  $w_i$  is the prefix to another codeword  $w_j$  ( $i \neq j$ ).

Equivalently,  $w_j \neq w_i$  for any  $w \in T^n$ .

Prefix codes are also known as instantaneous codes.

Prefix ~~length~~ codes are variable length codes and are uniquely decodable that is all prefix codes are uniquely decodable but converse is not always true, that is, all uniquely decodable codes may not be prefix codes.

Ex  $\Rightarrow$  Code  $\{0, 01, 001, 011\}$  is uniquely decodable but not a prefix code.

Code  $\{0, 10, 110, 111\}$  is a prefix code.