1.What is a turing machine?

Turing machine is a simple mathematical model of a computer. TM has unlimited and unrestricted memory and is a much more accurate model of a general purpose

computer. The turing machine is a FA with a R/W Head. It has an infinite tape divided into cells ,each cell holding one symbol.

2.What are the special features of TM?

In one move ,TM depending upon the symbol scanned by the tape head and state of the finite control:

Changes state.

Prints a symbol on the tape cell scanned, replacing what was written there. Moves the R/w head left or right one cell.

3. Define Turing machine.

A Turing machine is denoted as M=(Q, Σ, Γ ,δ ,q0, B,F) Q is a finite set of states.

Σ is set of i/p symbols ,not including B.

Γ is the finite set of tape symbols. q0 in Q is called start state.

B in Γ is blank symbol.

F is the set of final states.

δ is a mapping from Q X Γ to Q X Γ X {L,R}.

4.Define Instantaneous description of TM.

The ID of a TM M is denoted as α1q α2 . Here q is the current state of M is in Q;

α1 α2 is the string in Γ * that is the contents of the tape up to the rightmost nonblank symbol or the symbol to the left of the head, whichever is the rightmost.

5. What are the applications of TM?

TM can be used as:

Recognizers of languages.

Computers of functions on non negative integers. Generating devices.

6.What is the basic difference between 2-way FA and TM?

Turing machine can change symbols on its tape , whereas the FA cannot change symbols on tape. Also TM has a tape head that moves both left and right side ,whereas

the FA doesn't have such a tape head.

7.Define a move in TM.

Let X1 X2…X i-1 q Xi…Xn be an ID.

The left move is: if δ (q, Xi)= (p, Y,L) ,if i>1 then

X1 X2…X i-1 q Xi…Xn |---- X1X2… X i-2 p X i-1 Y X i+1…Xn.

M

The right move is if δ (q, Xi)= (p, Y,R) ,if i>1 then

X1 X2…X i-1 q Xi…Xn |---- X1X2… X i-1Y p X i+1…Xn.

M

8. What is the language accepted by TM?

The language accepted by M is L(M) , is the set of words in Σ * that cause M to enter a final state when placed ,justified at the left on the tape of M, with M at qo and

the tape head of M at the leftmost cell. The language accepted by M is:

{ w | w in Σ * and q0w |--- α1 p α2 for some p in F and α1 ,α2 in Γ * }.

9. What are the various representation of TM?

We can describe TM using: Instantaneous description.

Transition table. Transition diagram.

10. What are the possibilities of a TM when processing an input string?

TM can accept the string by entering accepting state. It can reject the string by entering non-accepting state.

It can enter an infinite loop so that it never halts.

11. What are the techniques for Turing machine construction?

• Storage in finite control.

• Multiple tracks.

• Checking off symbols.

• Shifting over

• Subroutines.

12. What is the storage in FC?

The finite control(FC) stores a limited amount of information. The state of the

Finite control represents the state and the second element represent a symbol scanned.

13. What is a multihead TM?

A k-head TM has some k heads. The heads are numbered 1 through k, and move of the TM depends on the state and on the symbol scanned by each head. In one

move, the heads may each move independently left or right or remain stationary.

14.What is a 2-way infinite tape TM?

In 2-way infinite tape TM, the tape is infinite in both directions. The leftmost square is not distinguished. Any computation that can be done by 2-way infinite tape

can also be done by standard TM.

15.Differentiate PDA and TM.

PDA	TM
1. PDA uses a stack for storage.	1. TM uses a tape that is infinite .
2.The language accepted by PDA is CFL.	2. Tm recognizes recursively enumerable languages.

16. What is a multi-tape Turing machine?

A multi-tape Turing machine consists of a finite control with k-tape heads and k- tapes ; each tape is infinite in both directions. On a single move depending on the state of

finite control and symbol scanned by each of tape heads ,the machine can change state print a new symbol on each cells scanned by tape head, move each of its tape head independently one cell to the left or right or remain stationary.

17.What is a multidimensional TM?

The device has a finite control , but the tape consists of a k-dimensional array of cells infinite in all 2k directions, for some fixed k. Depending on the state and

symbol scanned , the device changes state , prints a new symbol and moves its tape- head in one of the 2k directions, either positively or negatively ,along one of the k-axes.