4.Consider the following Turning machine

$$\delta(A, a) \rightarrow (B, a, R \rightarrow) \quad (1)$$
$$\delta(B, b) \rightarrow (B, b, R \rightarrow) \quad (2)$$
$$\delta(B, a) \rightarrow (B, a, R \rightarrow) \quad (3)$$
$$\delta(C, b) \rightarrow (B, b, R \rightarrow) \quad (4)$$
$$\delta(C, a) \rightarrow (B, a, R \rightarrow) \quad (5)$$
$$(6)$$

d is the state.the language accepted by the TM is

$$a)ab * ab * b)ab * ab * ac)ab + ab + ad)a * (ba) * a \quad (7)$$
$$(8)$$

5.Consider the following Turing machine

$\delta(B, Blank) \rightarrow (C, Blank, R \rightarrow)$

C is the final state
On input ab , the machine will
a) Halt on acceoting state b) Go into infinite loop
c) Crash d) Reach to final state but willl not halt

6.When does a Turing machine crash?

a) if the machine traverses all the inputs without traversing some state
b) if it traverses all its states till the input remains
c) if the transitional function is not defined for the present state and the input combimation
d) None of this

7. A single-tap Turing machine M has two states $q_0 and q_1, of which q_0 is the starting state. the tape alphabet of M is \{0,$

The table is interpreted as illustrated in the following.
the entry $(q_1, 1, R) in row q_0 and coulmn 1 signifies that if M is in state q_0 and reads 1 on the curent tape square, then it writes$
$which of the following statements is true about M?$
8.$Consider the language L_1, L_2, and L_3 as given in the following$
$which of the following statement is not true?$
$a) Push down automata (PDA) can be used to recognize L_1 AND L_2$

$b) L_1 is a regular language$
$c) All the three language are context free$
$d) Turing machines can be used to recognize all the language$

Answers:
1. d 2. c 3. c 4. b 5. b 6. c 7. a 8. c

Hints:

$$5. Aab \rightarrow aBb \rightarrow Aab \longrightarrow aBb....infinite times \quad (9)$$

$$7. For (b), (c), and (d) the machine loops infinitely. it only accepts null string. \quad (10)$$

$$8. L_3 Is not context free. \quad (11)$$

$$(12)$$

Chapter 1

Fill in the Blanks

1. All types of language are accepted by $\cdots\cdots\cdots$

2. $According to the chomsky hierarchy, type 0 language is called \cdots\cdots\cdots$

3. $The diagram of the Turing machine is like finite automata, but here the head moves \cdots\cdots\cdots$

4. $The head of the turing machine is called \cdots\cdots\cdots$

5. $The string a^n b^n c^n, n > 0 is accepted by \cdots\cdots\cdots$

6. $The turing machine is called \cdots\cdots\cdots$

7. $Two - stack PDA is equivalent to \cdots\cdots\cdots$

8. $The crash condition occurs if the read-write head of a Turing machine is over the \cdots\cdots\cdots$

9. $A turing machine is said to be in \cdots\cdots\cdots if it not able to move future.$

Answers:

1. Turing machine 2. unrestricted language 3. in both direction
4. Read-write head 5. Turing machine 6. universal machine
7. Turing machine 8. leftmost cell 9. halt state

Chapter 2

Exercise

1. Construct Turing machine for the following

$$a) L = \{a, b\}^+ \tag{2.1}$$
$$b) L = WW, Where W \in (a, b)^+ \tag{2.2}$$
$$c) L = WW^R, Where W \in (a, b)^+ \tag{2.3}$$
$$d) L = \{all even palindromes over (a, b)\} \tag{2.4}$$
$$e) L = a^n b^n c^n, n > 0 \tag{2.5}$$
$$f) L = n - 1, where n > 0 \tag{2.6}$$
$$\tag{2.7}$$

3.Design a Turing machine which replace 0 by 1 and 1 by 0 of the string traversed.

4. Design a Turing machine to accept the string L= $\{a^n b^m c^{n+m}, where n > 0, m > 0\}$.
($Hints : traverse an a, replace it by X, and move right to find the first c and replace it by Y. then, traverse left to find the secon$

5. Design a turing machine to accepts the string L = $\{a^m b^{m+n} c^n, where m, n > 0\}$.
6.$Design a turing machine by the transitional notation for the following languages$
$a) L = a^n b^n, n > 0$
$b) L = \{a^n b^n c^m d^m, where m, n \geq 1\}$
$c) L = \{a^n b^n c^m, where n, m \geq 1\}$

7. Make comments on the following statment that a finite state machine with two stacks is as powerful as a turing machine.

8. Design a two-stack PDA for adding and subtracting two numbers.
9.Design a two-stack PDA to accepts the string L=$\{a^m b^{m+n} c^n, where m, n > 0\}$.