08/02/22 Tutorial-05

U19CS009

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Q-1 What are the uses of OPTAB (Mnemonic operation table) and Symbol table SYMTAB during assembling procedure? Specify the uses of each during pass 1 and pass 2 of a two pass assembler.

Ans

OPTAB → used to lookup mnemonic operation code and translate them to their machine language equivalents. In complex assembler the table also contains info about instruction format and length.

→ In (pass 1) the OPTAB is used to lookup and (validate) operation code in source program and to (find instruction length) for incrementing LOCTR.

→ In (pass 2), it is used to translate opcode to machine language

SYMTAB → It includes name and value for each label in source program, together with flags to indicate the error condition.

→ In (pass 1), labels are entered in SYMTAB along with their assigned address value as they are encountered. All symbol address value should get resolved in Pass 1.

→ In (pass 2) symbols used as operands are looked up the symbol table to obtain address value to be inserted in assembled instructions.

→ SYMTAB is usually organized as hash table for efficiency of insertion and retrieved.

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Q.2 What are assembler directives? list any 3.

Ans Directives are instruction used by assembler to help automate the assembly process and to improve program reliability. Directives are used essentially in a pre-processing stage of assembly process.

-> Following are 3 assembler directives:-

-> ORIGIN -> It tells assembler where to load instructions & data into memory.

-> EQU -> It tells programmer to define symbol and specify their values.

-> LTORG -> It allows programmer to specify where literals should be placed in memory

Q-3 Find out ~~memory~~ address using LC

```
START  101
READ   N
MOVER  BREG, ONE
MOVEM  BREG, TERM
AGAIN  MULT  BREG, TERM
MOVER  BREG, TERM
ADD    CREG, ONE
MOVEM  CREG, TERM
COMP   CREG, N
BC     LE, AGAIN
MOVEM  BREG, RESULT
PRINT  RESULT
STOP
N      DS 1
```

->

```
RESULT  DS 1
ONE     DS '1'
TERM    DS 1
```

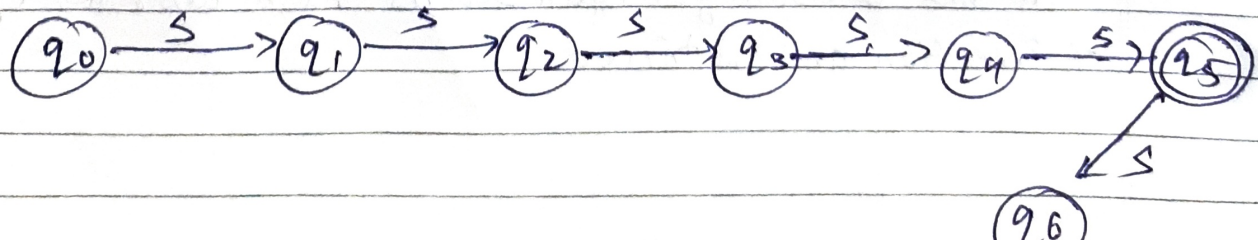
Ans

	SOURCE PROGRAM	MACHINE CODE			
	START 101				
	READ N	101	09	-	113
	MOVER BREG, ONE	102	04	02	115
	MOVEM BREG, TERM	103	05	02	116
AGAIN	MULT BREG, TERM	104	03	02	116
	MOVER CREG, TERM	105	04	03	116
	ADD CREG, ONE	106	01	03	115
	MOVEM CREG, TERM	107	05	03	116
	COMP CREG, N	108	06	03	113
	BC LE, AGAIN	109	07	02	104
	MOVEM BREG, RESULT	110	05	02	114
	PRINT RESULT	111	10	-	114
	STOP	112	00	-	-
	N DS 1	113	-	-	001
	RESULT DS 1	114	-	-	001
	ONE DS '1'	115	-	-	001
	TERM DS 1	116	-	-	001

Add -> N = 113
RESULT -> 114
ONE -> 115
TERM -> 116

Q-4 Design automata for set of all strings of length 5.

Ans Let input character be denoted as 's'



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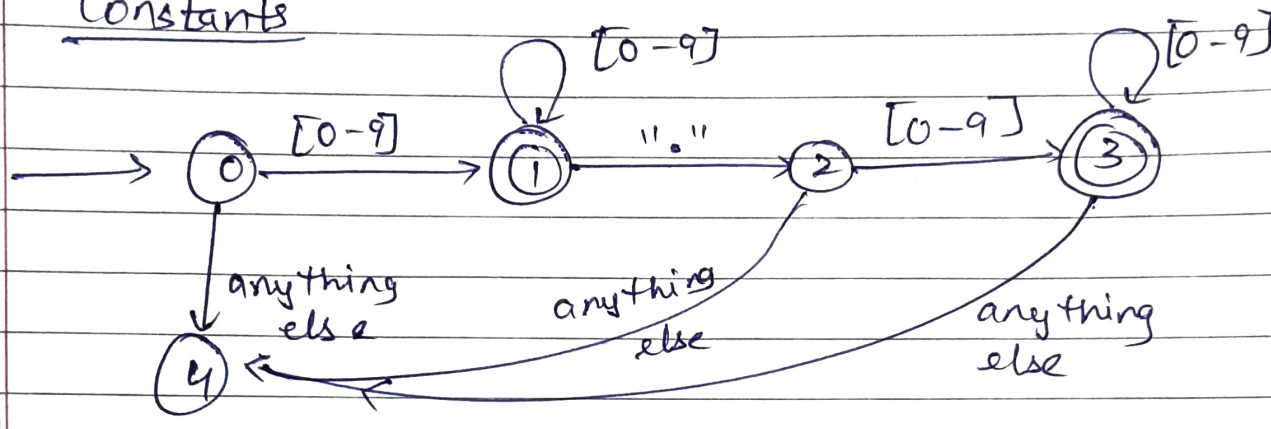
Q-5 Design automata for identifying constants and keywords

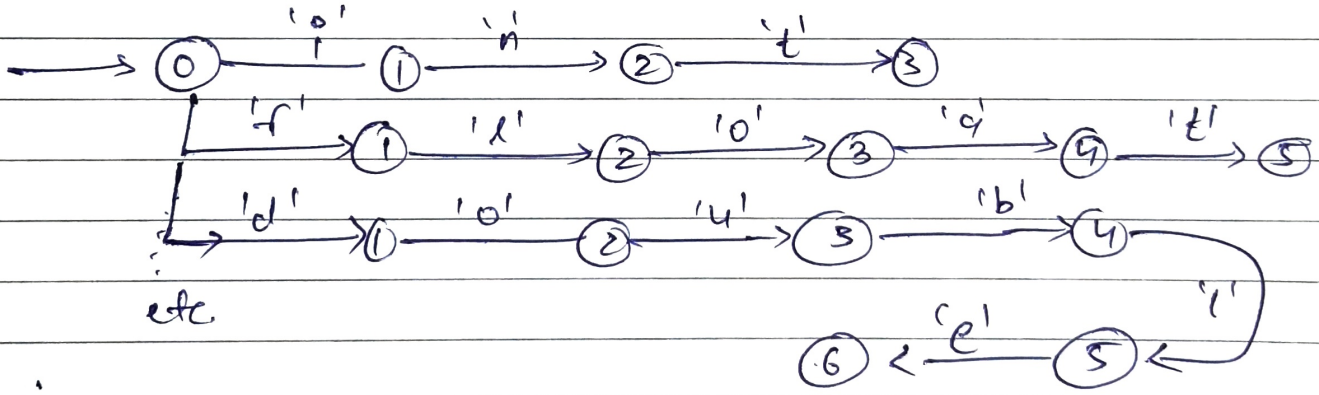
Ans

Constants



Key words :-

(a) int, float, double, else, ---



if any other character occurs, than exit with error ie, invalid state