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System Softwares
Tutorial 6

Ans 1.
A macro is a sequence of instructions, assigned by a name and could be used anywhere in the program.

A macro definition is a sequence of instructions that define how the macro will function when called. For example,

```
%macro write_string 2
    mov eax,4
    mov ebx,1
    mov ecx,%1
    mov edx,%2
    int 80h
%endmacro
```

A macro call is the instruction where the macro functionality is invoked and used accordingly, for example,

~~write_mes~~
write_string msg1,2

Ans 2. Algorithm for Macro Expansion:-

1. Perform initialisation for the expansion of macro.
   a) MEC := MDTP field of the MNT entry.
   b) Create EVTAB with #EV entries and set EVTAB_ptr.
   c) Create APTAB with PP+KP entries and set APTAB_ptr.
   d) Copy Keyword Parameter defaults from entries KPDTAB[KPDTP], KPDTAB[KPDTP+#KP-1] into APTAB[PP+1] to APTAB[PP+KP]

f) For keyword parameters in the actual parameter list, Search the keyword name in parameter name field of KPDTAB [KPDTP] to KPDTAB[KPDTP+KP-1]

2. While statement pointed by MEC is not MEND statement
a) If a model statement, then,
i) Replace ?# operands of the form (P, n) and (E, m) by value APTAB[n] and EVTAB[m] respectively.
ii) Output the generated statement.
iii) MEC := MEC + 1

b) If a set statement with the specification (E, M) in the label field then,
i) Evaluate the expression in the operand field and set an appropriate value in EVTAB[m]
ii) MEC := MEC + 1

c) If AGO statement with (S, #s) in operand field,
MEC = SSTAB[SSTP+s-1]

d) If an AIF statement, with (s, #s) in operand field.
If condition is true then,
MEC := SSTAB[SSTP+s-1]

3. Exit from Macro Expansion.

Ans 3. There are two types of formal parameters which are as follows:-

1. Positional parameter :- Order cannot be changed in macro call.

Example :-
Prototype = INCR &MEM_VAL, &INC_VAL, &REG
Call = INCR A, B, AREG

2. Keyword Parameters :- Orders can be changed in macro call.

Example :-
Prototype = INCR &MEM_VAL =, &INC_VAL =, &REG =
Call = INCR &INC_VAL = B, REG = AREG, MEM_VAL = A

Ans 4. A nested macro call may constitute a macro which in turn calls on another macro.
The macro that contains the nested call is known as outer macro call and the macro call in the nested call is known as Inner Macro call.

Example :-
```
INSIDE MACRO
SUBB A, R3
ENDM

OUTSIDE MACRO
MOV A, #42
INSIDE
MOV R7, A
ENDM
```