Problem-1

a) MOV AX, [CX, +SI]
   CX can't be used in the based indexed addressing mode.

b) MOV 29H, CS: [DI]
   Immediate addr. mode can't be used on the destination side.

c) OUT AX, 20H
   For OUT instruction, AX must be the source and the port number must be used on the destination side.

d) MOV AX, [SI + DI + 6]
   In the Based Indexed Addressing Mode, we can't use two indexed registers together. One of them must be a base reg.

e) IN AL, 1234H
   A 16-bit port address must be supplied through register DX.

f) MOV [BX + 2], [SI]
   For move instruction, both operands can't be in memory.

Problem-2

ORG 1000H
START:
  MOV AX, 1000H
  MOV DS, AX ; (DS) = 1000H
  MOV SI, 2346H ; DS: SI Points to 12346H
  MOV AX, 3000H
  MOV ES, AX ; (ES) = 3000H
  MOV DI, 4568H ; ES: DI Points to 34568H
  MOV CX, 2000 ; Counter = 2000
  CLD ; Clear DF
  MLOOP:
    MOV AX, ES: [DI] ; Move a word from [ES: DI] to AX
    XCHG [SI], AX ; Exchange AX with [DS: SI]
    STOSW
    INC SI
    INC SI ; Adjust pointer
  LOOP MLOOP
DONE:

Problem-3

ORG 1000H
START:
  MOV SI, 5000H ; DS: SI Points to starting location
  MOV DI, 4000H
  MOV AX, 0CDEFH
  STOSW
  MOV AX, 89ABH
  STOSW
  MOV AX, 4567H
  STOSW ; Store Quadword
  MOV AX, 0123H ; 0123456789ABCDEFH
  STOSW
  MOV DI, 4000H ; Reset DI TO 4000H
  MOV CX, 200 ; Counter = 200
  MOV BYTE PTR ES: [6000H], 1 ; Initialize flag to 1
  CLOOP: CMPSW
    JNZ CP1
  CMPSW
  JNZ CP2
  CMPSW
  JNZ CP3
  CMPSW
  JNZ CP4
  JMP DONE ; If Found then Done
CP1:
  ADD SI, 2
CP2: ADD SI, 2
CP3: ADD SI, 2 ; SI points to next Qword
CP4: MOV DI, 4000H ; RESET DI
  LOOP CLOOP ; CONTINUE
  MOV BYTE PTR ES: [6000H], 0 ; Not Found (Flag = 0)
DONE:

Problem-4

a) MOV [SI + 5], AX
   Physical address = 16*[DS] + SI + 5 = 20000 + 0160 + 5 = 20165H

b) MOV CS: [BP + DI], AX
   Physical address = 16*[CS] + BP + DI = 10000 + 0140 + 0180 = 102C0H

c) MOV [BX + SI + 6], AX
   Physical address = 16*[DS] + BX + SI + 6 = 20000 + 0120 + 0160 + 6 = 20286H

d) MOV SS: [BX + DI + 2], A
   Physical address = 16*[SS] + BX + DI + 2 = 40000 + 0120 + 0180 + 2 = 402A2H

e) MOV [BP + SI + 6], AX
   Physical address = 16*[SS] + SI + BP + 6 = 40000 + 0160 + 0140 + 6 = 402A6H

f) MOVSW
   Physical address = 16*[ES] + DI = 30000 + 0180 = 30180H

Problem-5

a) JMP DWORD PTR [DI]
   IP and CS are loaded from location pointed to by DI
   IP = 1520H and CS = 1045H

b) LES SI, [BX]
   ES = 2060H and SI = 8629H

c) DIV WORD PTR[604H]
   DX: AX/WORD
   Quotient put to AX
   Remainder put to DX
   Here 06040105/2060 will give quotient 2F91H and remainder 0AA5H
   Therefore AX = 2F91H and DX = 0AA5H

d) SHL DX, CL
   The count is 5
   Initially DX = 0604H = 0000 0110 0000 0100
   Finally DX = C080H = 1100 0000 1000 0000

Problem-6

The loop will be executed 128 times. The initial count is 256 and each time the loop is executed the count is decremented by 1 and a check is made to see if the count = 0 and if the zero flag is set. If count is 0 then we get out of the loop. When the count is 128 the zero flag is set and the loop stops.