Assignments -1

1. Explain the workflow of the following instruction

    MOV AX, BX

2. Explain the execution of the following program which flags will be set.

```
(a) MOV DH,3              (c) MOV CL,1
    NEG DH,2                  SUB CL,65H
    SUB DH,1                  NEG CL,21H
    SUB DH,73H               ADD CL,86H
    ADD DH,79H               SBB CL,33H
    ADD DH,2
    CMP DH,0FAH           (d) MOV AX,0F24FH
    ADD DH,3                  MOV BX,0A3F5H
                             ADD BX,AX
(b) MOV AX,0FEH              SBB AX,0F24EH
    INC AX                   MOV CX,1000H
    MOV BX,0                 ADD CX,0F14CH
    ADD BX,AX                ADC CX,0EEEEH
    NEG BX
    SUB AX,BX            (e) MOV AX,9000H
    NEG AX                   SUB AX,0FFFFH
    NEG BX                   MOV CX,5750H
    SBB AX,BX                ADC CX,0AABBH
    DEC AX                   MOV DX,0EBB3H
    ADC BX,BX                ADC DX,144CH
    SUB AX,BX                MOV BX,2H
    NEG BX                   ADD BX,0EFFEH
    NEG AX
```

3. Two 8-bit numbers X and Y are stored in memory. Calculate Z based on the following equation and store it in memory as 16-bit number. Discard the remainder in division operation.

$$Z = (X^2 + Y^2)/(X^2 - Y^2)$$

4. Two numbers X1 and X2 are stored in memory. Perform the following operations and store the results in X3.

    X3= (X1 AND 0FH) XOR (X2)

5. Develop a program to compare two arrays of 10 elements each. If they are same, store "1" at memory location [5000H] otherwise store "0".

6. A string **"MY NAME IS "** is stored in memory . Now add the string "CLAUS" with the name such that it make becomes a 20-character string to look like and store in another memory location in continuous.

    MY NAME IS SANTA CLAUS

7. In the following program determine the values of X1, Y1, Z1 at the end

    DATA SEGMENT
    ```
    X1   DW   0302H
    Y1   DW   0715H
    Z1    DW   F227H
    ```

```
     DATA  ENDS

     CODE SEGMENT
     ASSUME  CS: CODE,    DS: DATA
     START:   MOV   AX, DATA
              MOV  DS, AX
              MOV  AX, X1
              MOV   BX, Y1
              MOV   CX, Z1
              PUSH   CX
              PUSH    BX
              PUSH    AX
              PUSH    BX
              PUSH    CX
              PUSH    AX
              XCHG    BX, Z1
              XCHG    CX, AX
              MOV     Z1, AX
              MOV   Y1, CX
              MOV    X1, BX
     CODE   ENDS
     END      START
```

8. See if you can spot the grammatical (syntax) errors in the following instructions.
    (a) MOV BH, AX (b) MOV DX, CL (c) ADD AL, 2073H (d) MOV 7632H, CX (e) IN BL, 04H

9. Describe the function of each assembler directives and instruction statement in the following short program

```
;PRESSURE READ PROGRAM

DATA_HERE SEGMENT
     PRESSURE  DB  0        ;storage for pressure
DATA_HERE ENDS

PRESSURE_PORT      EQU 04H  ;Pressure sensor connected
                            ; to port 04H
CORRECTION_FACTOR EQU 07H   ;Current correction factor
                            ; of 07

CODE_HERE SEGMENT
     ASSUME CS:CODE_HERE, DS:DATA_HERE
     MOV   AX, DATA_HERE
     MOV   DS, AX
     IN    AL, PRESSURE_PORT
     ADD   AL, CORRECTION_FACTOR
     MOV   PRESSURE, AL
CODE_HERE ENDS
          END
```

10. Write the 8086 instruction which will perform the indicated operation.
       a. Copy AL to BL
       b. Load 43H in CL

c. Increment the contents of CX by 1
d. Copy SP to BP
e. Add 07H to DL
f.   Multiply AL times BL
g. Copy AX to a memory location at offset 245AH in the data segment
h.   Decrement SP 1
i. Rotate the most significant bit of AL into the least significant bit position
j. Copy DL to a memory location whose offset is in BX
k. Mask the most significant bit of AX to a 1, but do not affect the other bits
l. Invert the lower 4 bits of BL, but do not affect the other bits

11. Actual location (address) of the memory for the following command

```
MOV AX, 5000 [BX] [SI]
```

12. What will happened if you execute the following command in 8086
   a) PUSH[5000H]
   b) CMP AX, BX
   c) NEG AL
   d) TEST AX, BX

13. An assembly language program which converts the Fahrenheit temperature to Celsius using the following relation:

C=(F-32)5/9

14. See if you can find any errors in the following instructions or groups of instructions.
   a. CNTDOWN: MOV BL, 72H
                        DEC BL
                        JNZ CNTDOWN
   b.   ADD CX, AL
   c. JMP BL
   d. JNZ [BX]
15. Compute the average of 4 bytes stores in an array in memory.
16. Write an assembly language program which outputs a 1-kHz wave on D0 of port FFAH. The basic principle here is to first output high and wait 1/3 th time of total time period on port pin, and then wait 2/3 th time a low (of total time period). Repeat the process continuously. Remember that, before you can output to a port device, you must first initialize it.