



**COMSATS University Islamabad, Lahore Campus**

**Department of Computer Engineering**

**Microprocessor Systems and Interacting (CPE342)**

**Course Instructor: Engr. Usman Rafique**

**Assignment \_\_TWO\_\_**

**Section: \_FA22-BCE-B\_**

**Submitted by:** Abdullah Laeeq

**Reg. number:** FA22-BCE-026

**Submitted on:** \_\_\_\_\_

|                   | Q1 | Q2 | Q3 | Total |
|-------------------|----|----|----|-------|
| Marks<br>Obtained |    |    |    |       |



Microprocessor Systems and Interfacing (CPE342) Course Instructor: Usman Rafique  
**COMSATS UNIVERSITY ISLAMABAD, Lahore Campus**  
**Department of Computer Engineering**

|                                                                                                                                                                                                                                                                                                              |                                                                   |                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|--------------------------|
| <b>Subject: Microprocessor Systems and Interfacing (CPE342)</b>                                                                                                                                                                                                                                              |                                                                   | <b>Batch: FA22-BCE-B</b> |
| <b>Assignment No. TWO</b>                                                                                                                                                                                                                                                                                    |                                                                   | <b>Total Marks: 30</b>   |
| <b>Handed over on: 20<sup>th</sup> March 2025</b>                                                                                                                                                                                                                                                            | <b>Submission Date: 27<sup>th</sup> March 2025<br/>(In class)</b> |                          |
| <b>Student's Name:</b> Abdullah Laeeq                                                                                                                                                                                                                                                                        |                                                                   |                          |
| <b>Registration Number:</b> FA22-BCE-026                                                                                                                                                                                                                                                                     |                                                                   |                          |
| <b>Instructions:</b> <ul style="list-style-type: none"><li>• Provide your solution in the space provided against each problem</li><li>• Back side of each leaf is for rough work only</li><li>• Submission after the deadline will not be graded</li><li>• Do not use lead pencil in your solution</li></ul> |                                                                   |                          |

**Note: The CPU referred to in this problem sheet is Intel 8086-88.**

**Problem 1**

**10 Marks**

Consider the following high-level language program structure. Construct complete assembly language program that can be generated from this program structure.

```
for(a=0; a<=250; a=a+2){  
    y = (x*a)-125;  
    if(y>100){  
        pair();  
        y++;  
    } //end if  
} //end for  
  
void pair(j,k){  
    j = j/k;  
} //end void
```

Assume all the variables **a, x, y, j** and **k** are 8-bit integers and are stored in BL, DL, DH, CL and CH, respectively.

**Solution:**

```
;a => BL  
;x => DL  
;y => DH  
;j => CL  
;k => CH
```

```
MOV BL,0  
MOV DL,1  
MOV DH,139  
MOV CL,55  
MOV CH,122
```

```
FOR:  
  MOV AL,BL  
  MUL DL  
  MOV DH,AL  
  SUB DH,125  
  
  CMP DH,100  
  JLE SKIP  
  CALL PAIR  
  INC DH
```

```
SKIP:  
  ADD BL,2  
  CMP BL,250  
  JBE FOR
```

```
JMP END
```

```
PAIR:  
  MOV AL,CL  
  DIV CH  
  MOV CL,AL
```

```
RET
```

```
END:
```

**Problem 2****10 Marks**

Construct an assembly language program that reads 1-byte data from 2000H and 1-byte data from 5000H. Place this data onto the stack, which is initially empty, such that the byte read from 1234H is the lower-byte and from ABCDH is the higher-byte of the 16-bit data that is to be placed onto the stack. Repeat this operation unless the stack segment becomes completely full. The stack segment starts from 9000H.

**Solution:**

```
MOV BX,1234H
MOV DS,BX

MOV SI,2000H
MOV [SI],55
MOV AL,[SI]

MOV BX,0ABCDH
MOV DS,BX

MOV DI,5000H
MOV [DI],25
MOV AH,[DI]

MOV BX,9000H
MOV SS,BX
MOV SP,0

MOV CX,8000H

COPY_LOOP:
    PUSH AX

LOOP COPY_LOOP
```

**Problem 3****10 Marks**

Construct an assembly language program that reads a word from stack segment and check whether it is odd or even. Check entire stack segment for this operation. Place the count of even words in AX and count of odd words in BX. The stack starts at B000H. Make use of a subroutine that checks the odd/even property of the word.

**Solution:**

```
MOV BX,0B000H
MOV SS,BX
MOV SP,0
MOV CX,30

LOOP_STACK:

POP DX
CALL CHECK

LOOP LOOP_STACK

JMP FINISH

CHECK:
TEST DX,1
JC ODD
INC AX
JMP END
ODD:
INC BX
END:
RET

FINISH:
```