

**For 100% Result Oriented IGNOU Coaching
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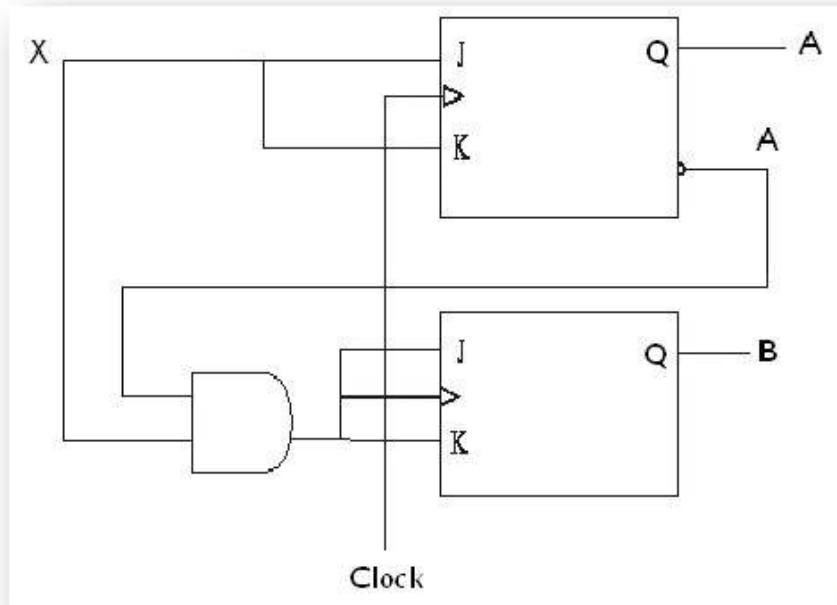
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Course Code
Course Title

BCSL-022
Assembly Language Programming Lab

1) Design a two bit counter circuit that counts till 2 only that is possible states are 00, 01, 10, 00.... The circuits should be designed using J-K flip flops. You must design them using state transition diagram and/or Karnaugh's map.

Hint: Two bit counter using J-K Flip flop:



Cycle	Q1	Q0 (Q1:Q0)	dec
0	0	0	0
1	0	1	1
2	1	0	2
3	1	1	3
4	0	0	0

2) Write and run the following programs using 8086 assembly language.

(a) Write and run an Assembly language program that translates a set of alphabets



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"ABCDEFGH" as "HBDIGCEAF" in a string. The remaining alphabets in the string are not changed.
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Hint:

```
.model small .stack 100h CR equ 13d LF equ 10d .data
msg1 db CR, LF, 'Enter an uppercase letter: $'
result db CR, LF, 'The lowercase equivalent is: $' bad_msg db CR, LF, 'Not an uppercase
letter: $' .code ; main program
start:
mov ax, @data mov ds, ax
mov ax, offset msg1 call puts
call getc ; read uppercase letter mov bl, al ; save character in bl cmp bl, 'A'
jl invalid ; if bl < 'A' goto invalid cmp bl, 'Z' ; if bl > 'Z' goto invalid jg invalid
; otherwise its valid
add bl, 32d ; convert to lowercase mov ax, offset result
call puts ; display result message mov al, bl
call putc ; display lowercase letter jmp finish
invalid:
mov ax, offset bad_msg ; not uppercase call puts ; display bad_msg
mov al, bl
call putc ; display character entered
finish:
```

```
mov ax, 4c00h
int 21h ; return to ms-dos
; subprograms getc, putc and puts should be defined here
end start
```

- (a) Write and run (using appropriate calling program) a subroutine in assembly language that converts an ASCII decimal digit (0 to 9) to equivalent binary digit value. Also write the calling program to this subroutine. You must pass the ASCII decimal digit to the subroutine as a parameter, and the subroutine should return the equivalent binary value. You must use stack for parameter passing.

Hint:

Uses a premade library Irvine32.inc

```
INCLUDE Irvine32.inc

.data; Data hard coded into the executable
tPromptBYTE "Enter a digit to convert from binary to ascii. > ", 0
iBinToAsciiBYTE 0

.data?; Data to be created on program initialization
.code; Executable code
main PROC
;{
callGetDigit
exit
;}
main ENDP
```

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```
GetDigit PROC
;{
    movedx, OFFSET tPrompt
    call WriteString

    call    ReadInt      ; Read a integer in, returns int in EAX
    or     al, 30h
    call    WriteChar

    call    Crlf
    call    WaitMsg
    ret
;}
GetDigit ENDP
END main
```

- (b) Write and run an assembly language program that two packed two digit BCD numbers. You may take the numbers to be in BL and DL registers. The result must be left in AX register as binary numbers. (You may convert the BCD numbers to equivalent binary).

Hint:

```
GIVEN BCD NUMBER SAY 24
; IT IS STORED AS IT IS IN MEMORY
; EVEN THOUGH IT IS STORED AS HEXADECIMAL 24
; IT IS NOT HEXADECIMAL 24 IT IS BCD 24
; NOW FOR BINARY CONVERSION
; SEPARATE 24 TO 02 AND 04
; MULTIPLY 04 BY 0A 04 TIMES THEN ADD 02 TO GET BINARY NUMBER
; THIS IS IN SHORT A DECIMAL TO HEXADECIMAL CONVERSION
```

```
; MVI B, 24H ;
; MOV A, B ;
; ANI 0FH ;
; MOV C, A ;
; MOV A, B ;
; ANI F0H ;
; RRC ;
; RRC ;
; RRC ;
; RRC ;
; MOV D, A ;
; XRA A ;
; MVI E, 0AH ;
```

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LOOP:

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```
; ADD E ;  
; DCR D ; MULTIPLY WITH 0A REGISTER D TIMES  
; JNZ LOOP ;  
; ADD C ;  
; STA XXXXH ;  
; HLT ; END OF PROGRAM
```