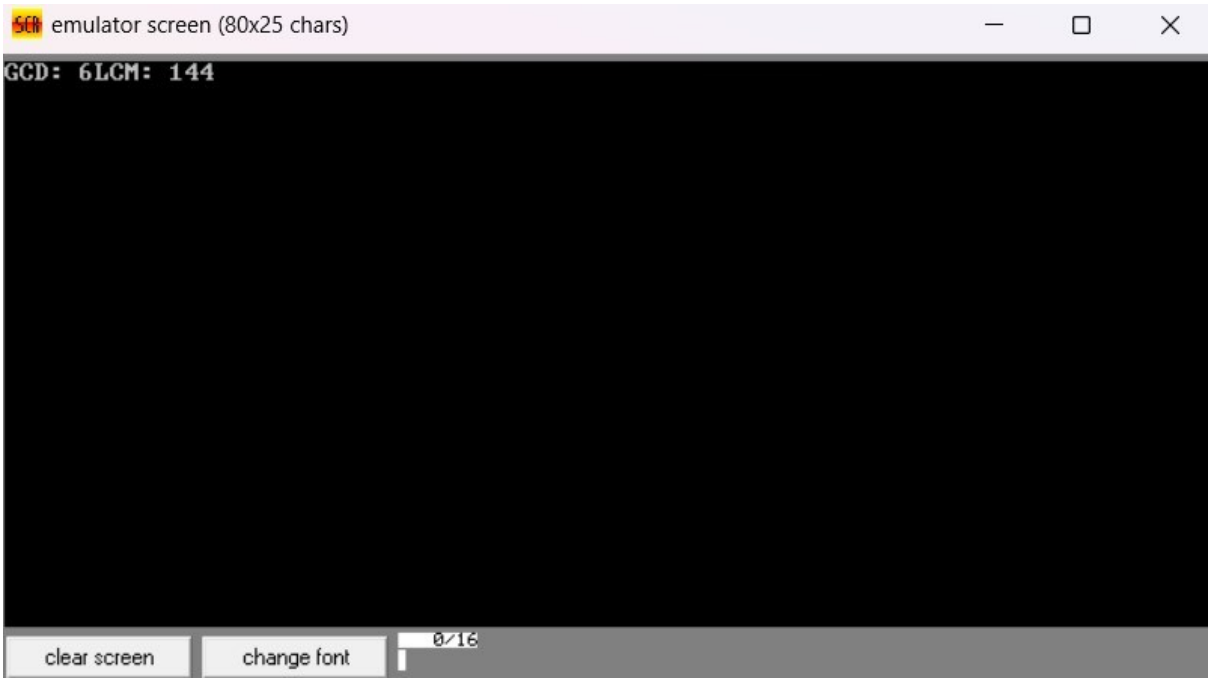
1. (a) Write a program in assembly language to find L.C.M of two single-digit numbers.
→ CODE

```
.model small
.stack 100h .data
  num1 db  48      ; First number (single byte)    num2 db 18       ;
Second number (single byte)    gcd_res db 0      ; To store GCD
result (single byte)    lcm_res dw 0      ; To store LCM result (two
bytes for larger result)    msg_gcd db 'GCD: $'
  msg_lcm db 'LCM: $'

.code main:
  mov ax, @data
  mov ds, ax       ; Initialize data segment

  ; Display message for GCD
  mov ah, 09h      ; DOS function to display string
lea dx, msg_gcd    int 21h

  ; Load num1 and num2 into AL and BL for GCD calculation
mov al, num1    mov bl, num2
  call gcd         ; Calculate GCD of num1 and num2
  mov gcd_res, al   ; Store GCD in gcd_res

  ; Display GCD result
mov al, gcd_res
  call display_result

  ; Calculate LCM using (num1 * num2) / GCD
mov al, num1      ; Load num1 into AL    mov ah, 0
; Clear AH for 16-bit multiplication    mov dl, num2
; Load num2 into DL
  mul dl          ; AX = num1 * num2 (result in AX)

  ; Divide AX by the GCD (stored in gcd_res)
mov cl, gcd_res   ; Load GCD into CL    div
cl          ; AX = (num1 * num2) / GCD

  ; Store the result in lcm_res
mov lcm_res, ax

  ; Display message for LCM
```

```
   mov ah, 09h       ; DOS function to display string
lea dx, msg_lcm
   int 21h

   ; Display LCM result
mov ax, lcm_res
   call display_result

   ; End the program
   mov ah, 4Ch
int 21h

; Function to calculate GCD using the Euclidean algorithm gcd
proc
   cmp bl, 0
   je end_gcd        ; If BL = 0, GCD is in AL

gcd_loop:
mov ah, 0
   div bl           ; Divide AL by BL, remainder in AH
mov al, bl        ; Move BL to AL (new A)     mov bl,
ah        ; Move remainder to BL (new B)
   cmp bl, 0
   jne gcd_loop      ; Repeat until remainder (B) = 0

end_gcd:
   ret              ; Final GCD is in AL
gcd endp

; Function to display a number in AX as decimal display_result
proc
   mov bx, 10        ; Divisor for decimal conversion
   xor cx, cx        ; Clear CX to use as counter for digits

convert_loop:
   xor dx, dx        ; Clear DX for division
   div bx           ; Divide AX by 10, remainder in DX (last digit)
push dx          ; Push remainder onto stack     inc cx           ;
Increment digit counter     cmp ax, 0         ; Check if
quotient is 0
   jne convert_loop   ; If not, continue dividing

print_digits:
```

```
   pop dx          ; Pop digit from stack
add dl, '0'      ; Convert to ASCII
   mov ah, 02h      ; DOS function to display character
   int 21h          ; Display digit
   loop print_digits  ; Repeat for all digits

   ret
display_result endp

end main
```

→output



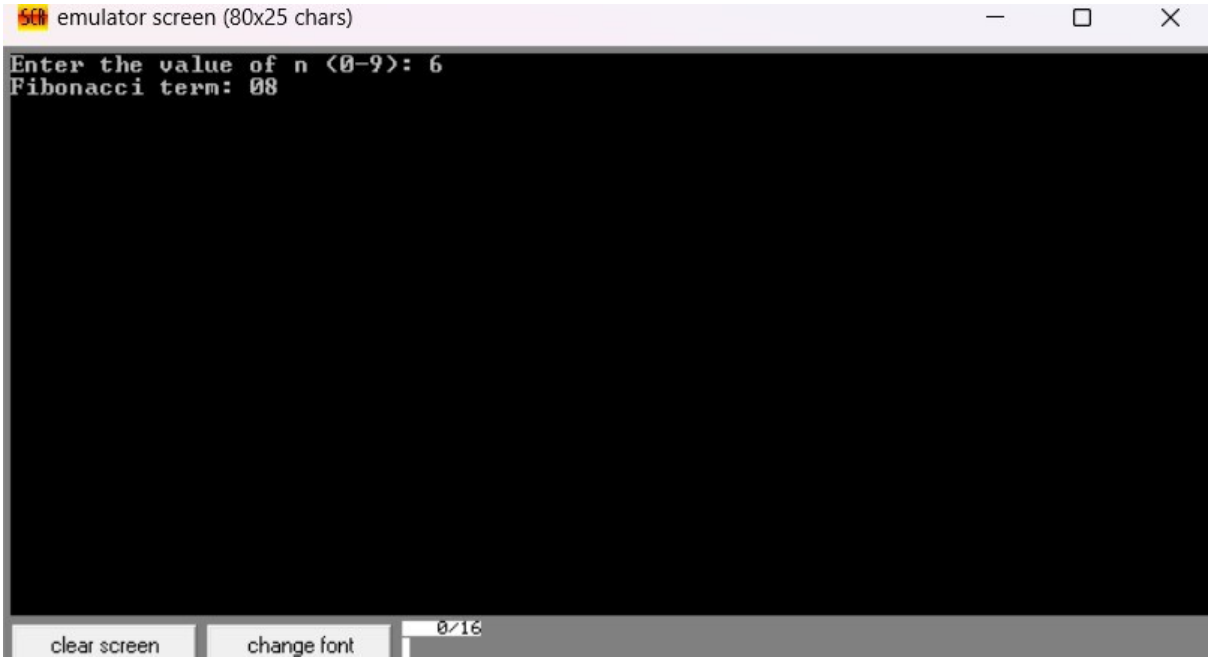
(b) Write an assembly language program to display the nth term of a fibonacci series. “n” must be a single digit number which may be taken from the user.

→CODE

```
.model small
.stack 100h .data
   msg db 'Enter the value of n (0-9): $'     ; Message to prompt user
fib_res db ?                        ; To store nth Fibonacci term
```

```
  n db ?                          ; User input (single-digit number)
  result_msg db 0Dh, 0Ah, 'Fibonacci term: $' ; Message to display result
result db '00$', 0Dh, 0Ah              ; Space to store result as string

.code main:
  mov ax, @data
  mov ds, ax           ; Initialize data segment

  ; Display message to enter the value of n
mov ah, 09h    lea dx, msg
  int 21h

  ; Take single-digit input from user
mov ah, 01h    int 21h
  sub al, '0'           ; Convert ASCII to integer
mov n, al             ; Store user input in 'n'

  ; Check if input is 0 or 1
mov al, n    cmp al, 0
  je fib_zero           ; If n = 0, set result to 0
cmp al, 1
  je fib_one            ; If n = 1, set result to 1

  ; Initialize Fibonacci terms for calculation
mov cl, al            ; Move n to CL for loop count
mov al, 1             ; Set AL = 1 for F(1)    mov bl, 0
; Set BL = 0 for F(0)
  dec cl                ; Adjust count to loop n-1 times

fib_loop:
  ; Calculate next term: F(n) = F(n-1) + F(n-2)    mov
ah, al            ; Store current F(n-1) in AH    add al, bl
; AL = F(n) = F(n-1) + F(n-2)    mov bl, ah            ;
Update F(n-2) to previous F(n-1)    dec cl
  jnz fib_loop          ; Loop until CL becomes zero (reached nth term)

  ; Store the nth Fibonacci term in fib_res
mov fib_res, al

display_result:
  ; Display result message
mov ah, 09h    lea dx,
result_msg    int 21h
```

```
   ; Convert result to ASCII and store in 'result' for correct display
   mov al, fib_res
   aam                  ; Split AL into AH (tens) and AL (units)
add ah, '0'             ; Convert tens to ASCII    add al, '0'
; Convert units to ASCII    mov result[0], ah       ; Store
tens digit in result    mov result[1], al       ; Store units
digit in result    jmp display_final

single_digit:
   add al, '0'            ; Convert single digit to ASCII
mov result[0], al       ; Store single digit in result
mov result[1], '$'      ; Add end-of-string marker

display_final:    ;
Display the result
lea dx, result    mov
ah, 09h
   int 21h

   ; End the program
   mov ah, 4Ch
int 21h

fib_zero:
   mov fib_res, 0         ; F(0) = 0
   jmp display_result

fib_one:
   mov fib_res, 1         ; F(1) = 1

output
```



Practice set:
2. Write an assembly language program to find the factorial of a given single-digit number.

→ CODE

```
.MODEL SMALL
.STACK 100H
.DATA
   msg db 'Enter a single-digit number (0-9): $'    ; Prompt message for input
   result_msg db 0Dh, 0Ah, 'Factorial: $'          ; Message to display the result
   result db '00000$', 0Dh, 0Ah                    ; Space to store factorial result as a string
   num db ?                                        ; Variable to store the input number
   fact dw 1                                       ; Variable to store the factorial result
```

```
.CODE
main:
   ; Initialize data segment
   mov ax, @data
   mov ds, ax

   ; Display prompt message
   mov ah, 09h
   lea dx, msg
   int 21h

   ; Take single-digit input from user
   mov ah, 01h
   int 21h
   sub al, '0'            ; Convert ASCII to integer
   mov num, al            ; Store user input in 'num'

   ; Initialize factorial calculation
   mov al, num
   mov ah, 0              ; Clear AH to extend AL to AX
   mov cx, ax             ; Move AX to CX (counter)
   mov ax, 1              ; Initialize AX to 1 (factorial result)

factorial_loop:
   cmp cx, 1              ; Compare CX to 1
   je end_factorial_loop  ; If CX is 1, end the loop
   mul cx                 ; Multiply AX by CX
   loop factorial_loop    ; Decrement CX and repeat the loop

end_factorial_loop:
   ; Store the factorial result in 'fact'
   mov fact, ax

display_factorial:
   ; Display result message
   mov ah, 09h
   lea dx, result_msg
   int 21h

   ; Convert the factorial result to ASCII
   mov ax, fact
   mov cx, 10             ; Prepare divisor (10) for unpacking digits
   lea di, result + 4     ; Start storing result from the end
```

```
convert_to_ascii:
   xor dx, dx            ; Clear DX for division
   div cx                ; AX = AX / 10, DX = remainder (last digit)
   add dl, '0'           ; Convert remainder to ASCII
   mov [di], dl          ; Store ASCII character in result
   dec di                ; Move to the next character position
   cmp ax, 0             ; Check if quotient is zero
   jne convert_to_ascii  ; Repeat if there are more digits

   ; Display the factorial result
   lea dx, result
   mov ah, 09h
   int 21h

   ; End the program
   mov ah, 4Ch
   int 21h

end main // Fcatorial  ke correct code
```

output