UNIT - I

C language was developed by "dennics M Ritche" in Bell laboratay & to developed uniques operating System.

Characteristics:
- It is easy to implement
- Structured language
- less time to execute

C language is successor of B language which was introduced in early 1970s. unique OS linus OS, my SQL are entirely developed with C langage

C language is formalised by ANSI [American National Standard Institute] in 1988.

★ Escape Sequence

\n	=	new line
\a	=	sound
\t	=	horizontal tab
\v	=	Vertical tab
\"	=	double quate
\'	=	single quate.
\\	=	back slash
\?	=	question mark
\b	=	back space

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ex:-2

```
1
12
123
1234
```

```
Printf("\t 1 \n \t 12 \n \t 123 \n \t 1234");
```

ex:- 3 - Escape sequence

- \n newline
- \a Sound
- \t horizontal tab.
- \v - vertical tab

```
Printf("Escape sequence \n \n \t newline \n
\a \t Sound \n \t horizontal tab
\n \v \t vertical tab");
```


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- Character set

Character set is Fundamental pro-material For any language it is use to represent any information like a natural language. computer language also have character set.

Alphabets - A to Z
digits - 0 to 9
special characters
Escape sequence
white spaces

special characters

~	tilde
%	percentage
|	vertical bar
@	at symbol
+	plus
<	less than
>	greater than
_	underscore
-	minus
^	carot
#	number sigh (hash)
=	equal to
&	ampersand

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(- left parenthis.
) - right parenthis.
* - asterisk.
\ - back slash.
' - apostrophe.
: - colon.
[- left bracket.
" - quotation mark.
; - semicolon.
] - right bracket.
! - exclamation mark.
, - comma.
{ - left flower brace.
? - Question mark.
. - dot operator.
} - right flower braces.

ACII

American standard code for Information

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Constant:

Constants refer the value that Program will not alter during the execution. This fixed values are called as constant. there are two simple ways in c to define constants.

#define (Pre-processor).
Const keyword

Area of circle : (1st method)

```
# define PI 3.14.

Void main()
{
   float area;
   int r;
   clrscr();
   Printf("Enter the value of r:");
   Scanf("%d", &r);
   area = PI * r * r;
   Printf(" area = %f ", area);
   getch();
}
```


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Area of circle.

```
Void main()
{
Const float Pi = 3.14;
Float area;
int r;
clrscr();
Printf("Enter the value of r:");
Scanf("%d", &r);
Area = Pi * r * r;
Printf("area = %f", area);
getch();
}
```

Keywords:

Keywords reserved words which pre-difined in the Programming. Keywords have the special meaning to the compiler. Keywords are part of the syntax and they can not be used. There are 32 keywords in c prog.

int	else	for	do	case
char	break	while	goto	
Float	auto	double	default	
if	const	continue	enum	

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extern
for
long
register
return
signed
static
sizeof
short
structure
switch
typedef
union
void
volatile
unsigned

Identifiers

Are names given to entity's such as variable, function, structures etc.
not use only key words from the identifiers.

Ex:-

int additionCode;
int additionCode;
double salary;

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Variable :-

Variable is the name given to the storage area that our program can manipulate.

```
int A;
float d;
char c;
```

each variable in c has a specific type which determines the size of memory.

Syntax :-

```
datatype (variable name);
float area;
```

Math Function :-

In math library we can functions take double as argument and return double as result.

Sqrt(x) :- It will gave square root of x.

Ex :- a = Sqrt(4)

a = 2.000000

2) exp(x) :- exp(x) = e^x e = 2.7182282

exp(1) = 2.718.
exp(10) = 54.598150.

3) log(x) :- log of x with base e.
Ex:-
log(2.0) = 0.693147.

4) log10(x) :- log of x with base 10.
Ex:-
log 10 = 1.000000.

5) ceil(x) :- smallest int that is greater than x.
ceil(5.2) = 6

6) Floor
~~Floor~~(x) :- greatest int that is smaller than x
Floor(5.2) = 5.

7) Pow(x, y) :- x^y
pow(2, 6) = 32.000000.

8) sin(x) :- x is in radium.
9) cos(x) :- x is in radium.
10) tan(x) :- x is in radium.
convert
To ~~multiply~~ radium in to ~~degree~~ multiply by $\pi/180 = 3.14/180$

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* Write a C program to Find the Following:-

1) The smallest integer value greater than or equal to x.
2) The largest integer value (i.e. less than or equal to x.
3) The natural logarithm of x
4) The common logarithm of x.
5) The square root of x.
6) x^2 power of
7) The value of e^2 power of.

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data types	Size (B)	format specifier	Range.
int or signed int	2	%d	-32768 - 32767
unsigned int	2	%u	0 - 65535
short int or signed short int	1	%hd	-128 - 127
unsigned short int	1	%hu	0 - 256
long int	4	%ld	-2147483648 - +2147483648
usingned long int	4	%lu	0 - 4294967295
long long int	8 $=2^{63}$		
unsigned long long int	8 $=2^{64}$		

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★ Floting point data type :- Float

types	size	format specifier	range
Float	4	%f	3.4E-38 to 3.4E+38
double	8	%lf	1.7E-308 to 1.7E+308
long double	16	%Lf	3.1E-4932 to 1.1E+4932

★ Character type :-

It is use to store character values.

types	size	Range
character singed	1	-128 to 127
character unsinged	1	0 - 255

★ Void :- No any value. It is generally use function which returns nothing.

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☆ Operators :-

(1) Arithmetic operators :-

+

-

*

/

%

(2) logical operators :-

&&

||

!=

(3) relational operators :-

<=

>=

>

<

==

!=

(4) assignment

=

+=

-=

*=

/=

%=

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(?operators)

→ C contains PowerFul operator that replace Sentain Statement of If, then, else

Syntax:-

exp1 ? exp2 : exp3;

Here exp1 is First evaluated if it is true then exp2 evaluated if ex1 is False then exp3 is evaluated.

ex:-

```
Void main()
{
    int x,y,ans;
    clrscr();
    printf("Take the value from the users:");
    scanf("%d%d",&x,&y);
    ans = x>y ? x : y;
    printf("greatest value is %d", ans);
    getch();
}
```

```
Void main()
{
    int x,y,ans;
    clrscr();
    printf("Take the value x:")
    scanf("%d",&x);
    printf("Take the value y:")
    scanf("%d",&y); ans = x>y ? x:y;
    printf("greatest value is %d", ans);
    getch();
}
```


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X :- 40

ans = x > 99 ? 100 : 200

OUTPUT :- 100

X :- 4

ans = x > 9 ? 100 : 200

OUTPUT :- 200.

ans = (a == 1 ? (b == 2 ? 3 : 5) :);

a = 1, b = 2 -> 3

a = 1, b = 12 -> 5

a = 11, b = 10 -> 0;

```
Void main()
{
    int x, y, z, ans;
    clrscr();
    Printf("Enter value from the user x:");
    scanf("%d", &x);
    Printf("Enter value from the user y:");
    ScanF("%d", &y);
    printf("Enter value from the user z:");
    Scanf("%d", &z);
    ans = (x>y ? (x>z ? x : z) : (y>z ? y : z));
    Printf("Greatest Value is %d", ans);
    getch();
}
```


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double a;

Printf ("%d", sizeof(a));

★ bitwise operators:-

&	and
|	or
^	NOR
~	NOT
>>	Shift Right
<<	Shift left

Apart from this operators

In C we have pointer operators

"*", "&", "." , "->" "()", "[]".

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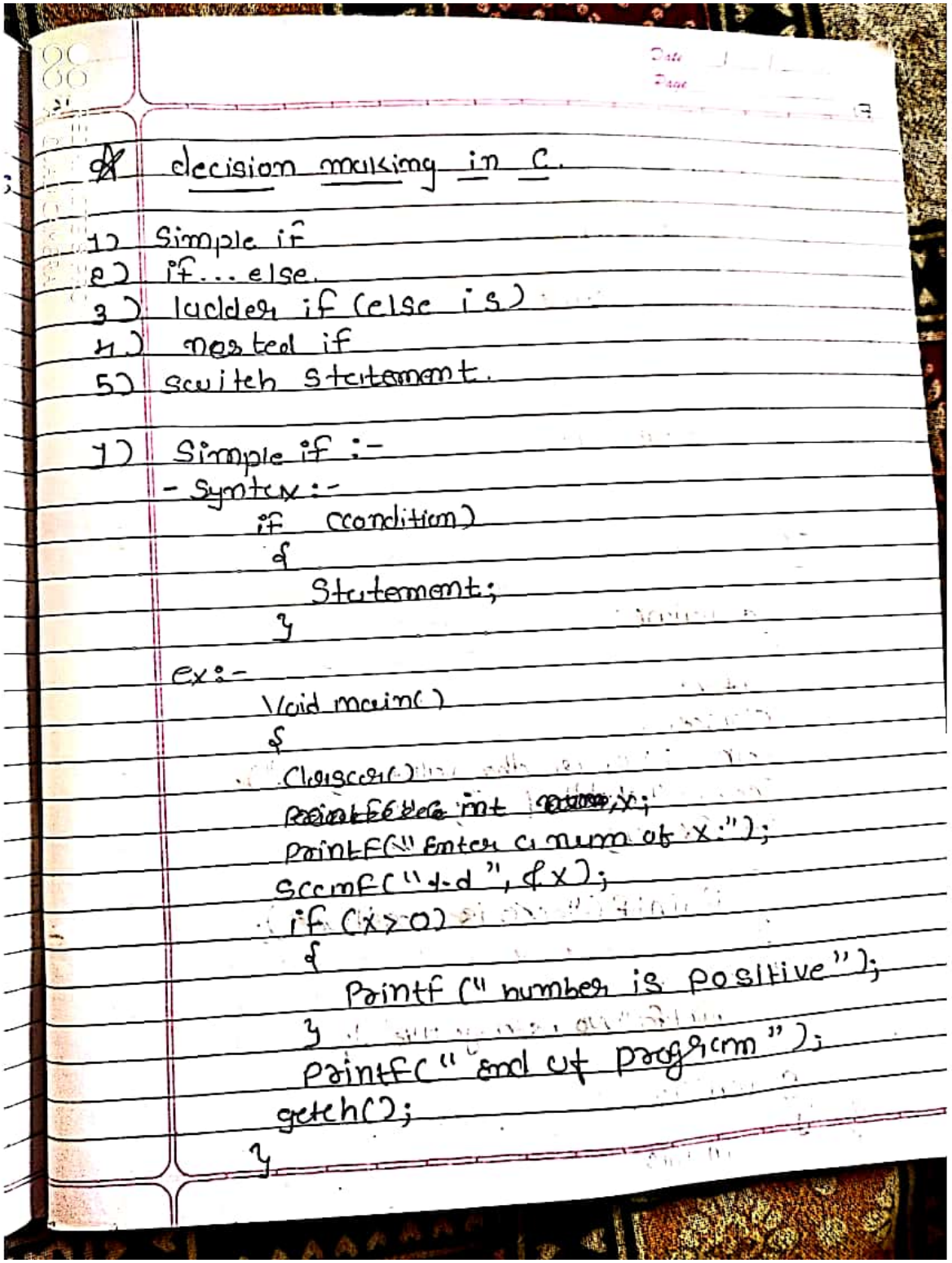

decision making in C.

1) Simple if
2) if... else.
3) ladder if (else is)
4) nested if
5) switch statement.

1) Simple if :-

- Syntax :-

```
if (condition)
{
    Statement;
}
```

ex :-

```
Void main()
{
clrscr();
int x;
printf("Enter a num of x:");
scanf("%d", &x);
if (x>0)
{
    Printf ("number is positive");
}
printf("end of program");
getch();
}
```


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else
{
Statement
}

:x:-

```
Void main()
{
int x;
clrscr();
Printf(" Enter the value of X");
Scanf("%d", &x);
if (x>0)
{
Printf(" No is positive");
}
else
{Printf("No is Negative");
getch();
}
```

in this

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If else statement First condition is evaluated if condition is true then statement of if block will be executed otherwise statement block will be executed.

```
take

Void main()
{
  int a,b;
  clrscr();
  Printf("Enter value of a:");
  Scanf("%d"& a);
  Printf("Enter value of b:");
  Scanf("%d", & b);
  if (a > b)
  {
    Printf("no a is greatest");
  }
  else
  {
    Printf("no b is greatest");
  }
  getch();
}
```


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(3) ladder if

if (condition)
{
  Statement 1
}
else if (condition)
{
  Statement 2
}
....
else
{
  Statement 3
}

-> The conditions are evaluated from the top down wards. As soon as true condition is found. the statement associated with it is executed and the rest of ladder is bypass. if none of the condition are true then the final else is executed. if finally else is not present no execution take the place & if all other condition are false.

```
}
else if (no<0)
{
  printf("Negative no");
}
else
{
  printf("no is zero");
}

Void main()
{
  int a,b,c;
  printf("enter a"); (Scanf("%d",&a)
  printf("enter b"); Scanf("%d",&b)
  Printf("enter c"); Scanf("%d",&c)
  if(a>b && a>c)
  {
    printf("a is max");
  }
else if(b>a && b>c);
  {
    printf("b is max");
  }
else { printf("c is max");
getch();}
```


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(4) Nested if

```
if (condition)
{
    if (condition2)
    {
    }
}
```

A nested if is an if that is the target of another if or else.

```
Void main()
{
    int a,b,c;
    printf("Enter value of a,b,c");
    scanf("%d %d %d",&a,&b,&c);
    if (a > b)
    {
        if (a > c)
        {
            printf("a is max");
        }
        else
        {
            printf("c is max");
        }
    }
}
```


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```
else
{
if(b>c)
{
printf("b is max:");
}
else
{
printf("c is max:");
}
}
getch();
}
```

(5) Switch

- C is bit in multi branch selection statement all switch cases is successfully test the value of expression against characters list of integer and/or characters is found. The constants in each case must be unique. If execute statement associated with that case expression must evaluate to int type. Thus, we can use characters expressions in int values but floating point expressions are not allowed.
- The default statement is executed if no match case found. The default is optional and it is not necessary

execution take place if all match is fail execution of is fastest all other selection if it is use properly.

Syntax:-

```
Switch(expr)
{
   case constent 1:
        Statement;
        break;
   case constent 2;
        Statement;
        break;
   ...
   default:
        Statement;
}
```

```
Void main()
{
int day;
Printf("enter a day:");
Scanf("%d", &day);
Switch(day)
{
   Case 1:
   Printf("Monday");
   break;
```


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```
case 2 :
    printf("Tuesday");
    break;

case 3 :
    printf("Wednesday");
    break;

case 4 :
    printf("");
    break;

case 5 :
    printf("");
    break;

case 6 :
    printf("");
    break;

case 7 :
    printf("");
    break;

default :
    printf("Invalied input");
}
getch();
```


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```
Void main()
{
  float no1, no2, ans, choice;
  clrscr();
  printf("Enter no1:");
  scanf("%f", &no1);
  printf("Enter no2:");
  Scanf("%f", &no2);
  Printf("1. Addition");
  Printf("2. Substraction");
  printf("3. Multiplication");
  Printf("4. Devision");

  Switch(choice)
    {
      case1:
      ans = a+b;
      bereak;

      case2:
      ans = a-b;
      bereak;

      case 3:
      ans = a*b;
      bereak;
```

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```
case 4:
    ans = a/b;
    breaks;

default:
    printf("Invalied input");
}
getch();
}
```

✱ Jump Statements

C has Four Statements that perform and an condi$mal bremch.

1) return = use for function.
2) goto
3) breaks = Switch and loop statsment.
4) continue = use for Function

We can use return and goto inside the $ Function and breaks and continue in conjuction with any of loop Statements we can also use breaks with switch Statement.

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(#) Go to Statments.

(1) goto label;
...
label:
Statement;

(2) label:
Statement;
goto label;
...

The goto statment requires label, opration. a lable is a valied identyfier, followed by colon.
lable must be in the same function ers the goto. ~~its~~ you can not Jump betwee, the function.

```
Void main()
{
  int i;
  clrscr();
  i=1;
  label:
  printf("%d", i);
  i++;
  if(i<=100)
    goto label;
  getch();
}
```


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★ Sum of term number using goto

```
void main().
{
    int n,i,sum;
    clrscr();
    i = 1, sum = 0
    printf("Enter value of n from user");
    scanf("%d", &n);
    label:
        printf("%d", i); sum = sum + i;
        i++;
    if (i<=n)
        goto label; printf("%d", sum);
    getch();
}
```


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Q Take any one number from user and print if only if it is positive using goto.

```
Void main()
{
    int no;
    clrscr();
    if(no<0)
        goto label;
    printf("\nNum is:%d", no);
label:
    printf("End of programm");
    getch();
}
```


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```
Void main()
{
  char c;
  clrscr();
  Printf("enter the character");
  Scanf("%c",&c);
  if(c>='a' && c<='z')
  {
    if(c>='a' && c<='z')
    printf("alphabet");
  else if(c>='0' && c<='9')
    printf("digit");
  else
    printf("Special characters");
  getch();
}
```


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☆ Iteration / Re

In c Iteration statment allows a set of instructions to be repletly executed until the Suertain condition is reach.

* Three type of loops in c
  1) while (entery control)
  2) do...while (exit control)
  3) for (entery control)

1) For loop :-

Syntax :-

```
for (initicilization; condition; increment/dec.)
{
    statements;
}
```

The initicilization is and assingment statment That is use to set loop control variable. The condition is a relational expression that determine when the loop exsist. The increment and dec. define how the loop control variable changes each time the loop is repited. the for loop countinue loop as the is true. once the condition false,

program executed resumes on the statement following the for.

- for(i=1; i<=100; i++).

```
{
    printf ("Dhermi");
}
```

- For (i=100; i>=1; i--)

```
{
    printf("Dhermi");
}
```

Q. Sum of 1 to n using for loop.

```
void main
{
  int ans, n, i;
  printf(" Enter the value of n");
  scanf(" %d", &n);
  for (i=1, i<=n ; i++)
  {
      ~~Printf~~ ans = ans + i;
  }   printf ("Sum is %d", sum);
  getch();
}
```


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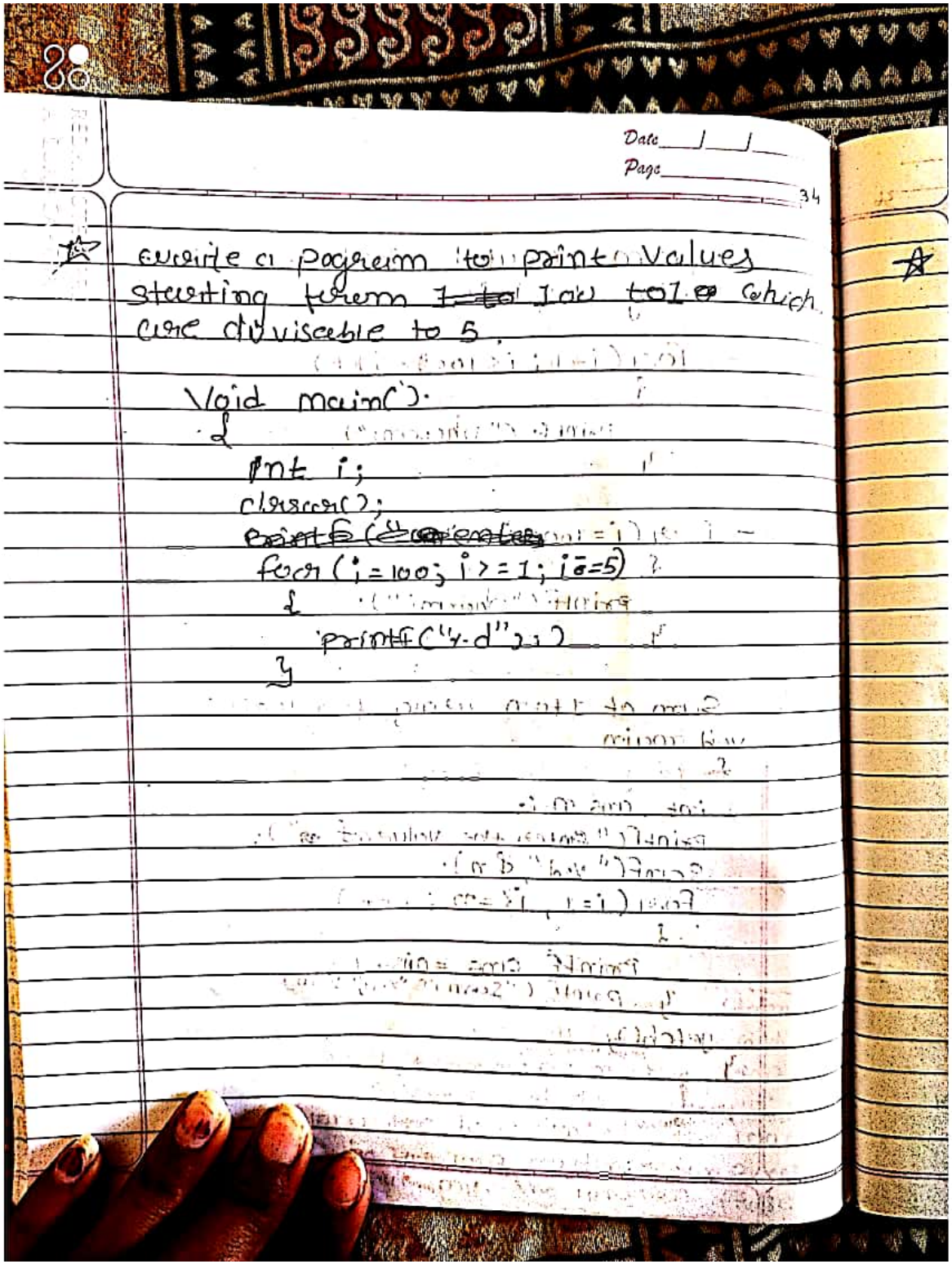

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★ Write a program to print values starting from 100 to 1 which are divisible to 5.

```
Void main().
{
int i;
clrscr();
for(i=100; i>=1; i-=5)
{
printf("%d",i);
}
```


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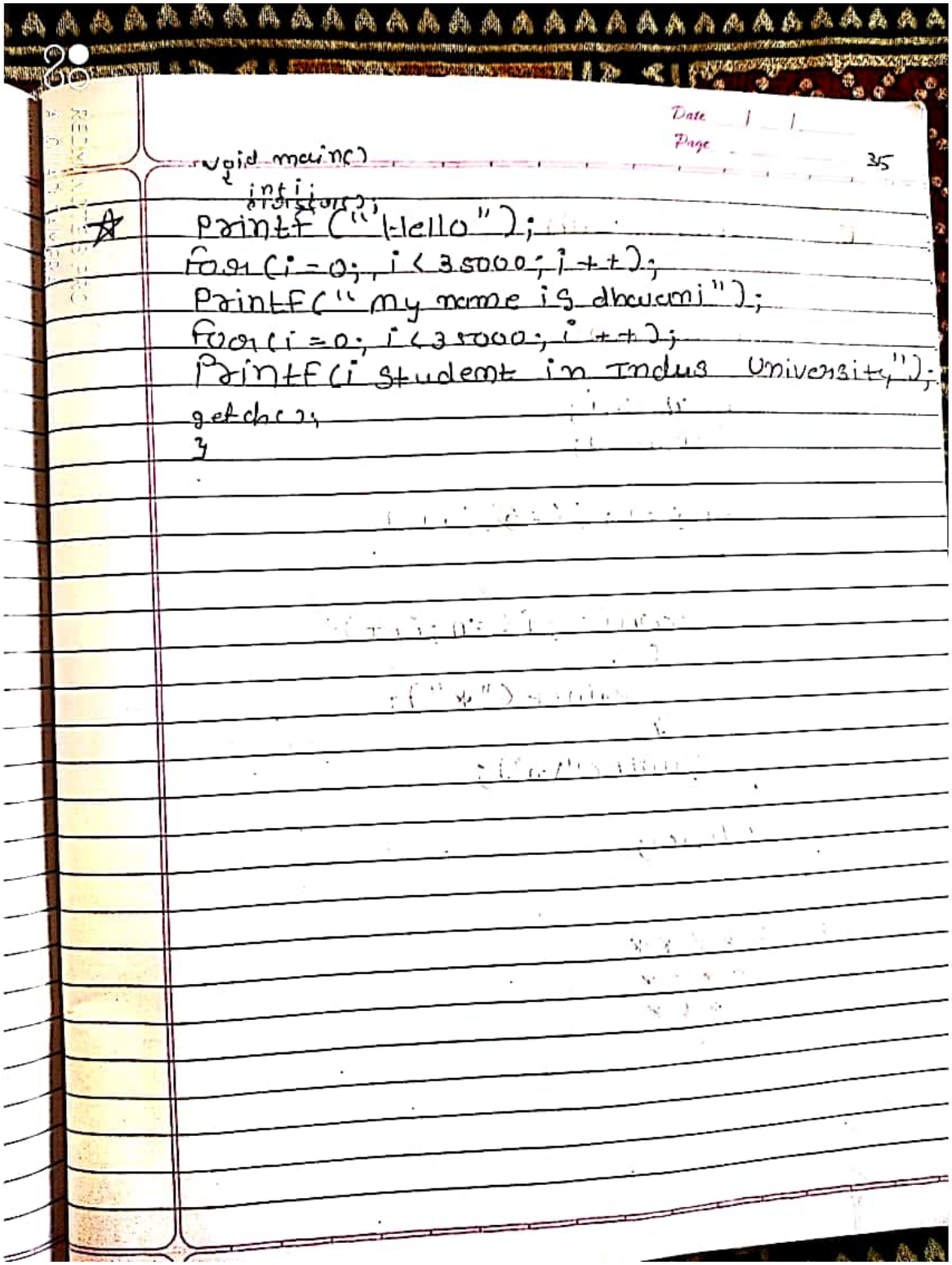

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```
void main()
{
int i;
int i;
printf("Hello");
for(i=0; i<35000; i++);
printf("my name is dhwani");
for(i=0; i<35000; i++);
printf(" student in Indus University,");
getche();
}
```


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★ Patterns with for

```
Void main()
{
    int n, k, j;
    clrscr();

    for(j=1; j<=3, j++)
    {
        for(i=1; i<=n; i++)
        {
            printf("*");
        }
        printf("\n");
    }
    getche();
}
```

n=5
j=3

* * * * *
* * * * *
* * * * *

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```
Void main()
{
  int i, k;
  clrscr();

  For(k=1; k<=8, k++)

  {
     For(i=1; i<=6; i++)
     {
        printf("%d", i);
     }
     printf("\n");
  }
  getch();
}
```


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```
void main()
{
  char i;
  int colums, rows, j;
  clrscr();
  printf("enter rows");
  scanf("%d", &rows);
  printf("enter columns");
  scanf("%d", &colums);

  for(j=1; j<=rows; j++)
    {
      for (i='A'; i<='A'+colums; i++)
        {
          printf("%c", i);
        }
        printf("\n");
    }
  getche()
}
```

A B C D E
A B C D E
A B C D E.

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1 1 1 1 1
0 0 0 0 0
1 1 1 1 1
0 0 0 0 0

```
Void main()
{
  int i,j,r,c;
  clrscr();
  printf("rows");
  scanf("%d",&rows);
  printf("Column");
  Scanf("%d",column");

  for(i=1;i<=r;i++)
   {
    for(j=1;i<=c;j++)
    {
      if(i%2==0)
       printf("0");
      else
       printf("1");
    }
    printf("\n");
  }
  getch();
}
```


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P = 2 (8)

```
void main()
{
    Float p, c, b, m, co;
    Float per;
    ClrScr();
    Start:
    printf("enter marks of 5 sub");
    Scanf("%f, %f, %f, %f, %f", &p,
                &c, &b, &m, &co);

    If(p<100 || c<100 || b<100 || m<100
                || co<100)
    {
    printf("Invalid marks : Try again");
        goto Start;
    }

    per=(p+c+b+m+co)/5;
    printf("%.2f", per);
```


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```
if(per >=90)
    printf("grade A");
else if(per >=80)
    printf("grade B");
else if(per >=70)
    printf("grade C");
else if(per >=60)
    printf("grade D");
else if(per >40)
    printf("grade E");
else
    printf("grade F");
```


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*

1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16

```
Void main()
{
   int i,j, count=1;
   clrscr();
   Printf ("Enter rows");
   scanf ("%d", &rows);
   Printf ("Enter column");
   scanf ("%d", &column);
   for (i=1; i<=r; i++)
     {
        for (j=1; j<=c; j++)
          {
            Printf ("%d", count);
            count++;
          }
      Printf ("\n");
     }
  getch();
}
```


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While loop:-

Syntax:-

```
while (conditions)
  {
    Statements
  }
```

- Statement is either and empty statement, a single statement, or a block of statement. The condition may be any expression and true is any I, 0 value. The loop executes while the condition is true when the condition becomes False, programme control passes to the lin immediately following the loops.
- while loop is entry control loop because condition is check befor exicution of loop.

ex:- I to N.

```
Void main()
{
 int i,N;
 clrscr();
 printf("Enter any number");
 Scanf("%d", &N);
 i=1;
 while (i<=N)
 {
   printf("%d ", i);
   i++;
 }
 getche();
}
```


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ex:- N to 1

```
Void main()
{
  int i,n;
  clrscr();
  printf("Enter any number:");
  scanf("%d",&no);
  i=N;
  while(i>=1)
  {
    printf("%d",i);
    i--;
  }
  getch();
}
```

ex:- Print all even integers From N to 1

```
Void main()
{
  int i,n;
  clrscr();
  printf("Enter any number");
  scanf("%d",&no);
  i=n;
  while(i>=1)
  {
    if(i%2==0)
    {
      printf("%d",i);
    }
```


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```
        i--
    }
    getch();
}
```

★ Find factorial of given number using while.

```
Void main()
{
    int i,n,Fact;
    i=1
    Fact = 1;
    clrscr();
    Printf("Enter value for N:");
    Scanf("%d", &N);
    while(i<=N)
    {
        Fact = Fact * i;
        i++;
    }
    Printf("%d", Fact);

    getch();
}
```


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Syntax:-

```
do
{
statements;
}
while (condition);
```

The do while loop repeat the step until condition becomes false

A) 1 to N

```
void main()
{
int i,n
clrscr();
i=1
printf ("enter the value of n:");
scanf ("%d", &n);
do
{printf("%d", i);
}
i++;
getch(); while (i<=N)
```


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N to 1.

```
void main()
{
  int i, n
  clrscr();
  printf("enther the value of N:");
  scanf("%d", &n);
  i=n;
  do
    {
      printf("%d", i);
      i--;
    }
  while (i>=1);
  getch();
}
```

write a program to take range from user and print all even num between that range.

```
Void main()
{
  int x, y, i;
  clrscr();
  repeat:
  printf("Enter the value of x:");
  scanf("%d", &x);
```


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```
    }
    i++;
}
while (k=4);
getch();
}
```

* write a Program to take value from user and print all odd num decrising their sum.

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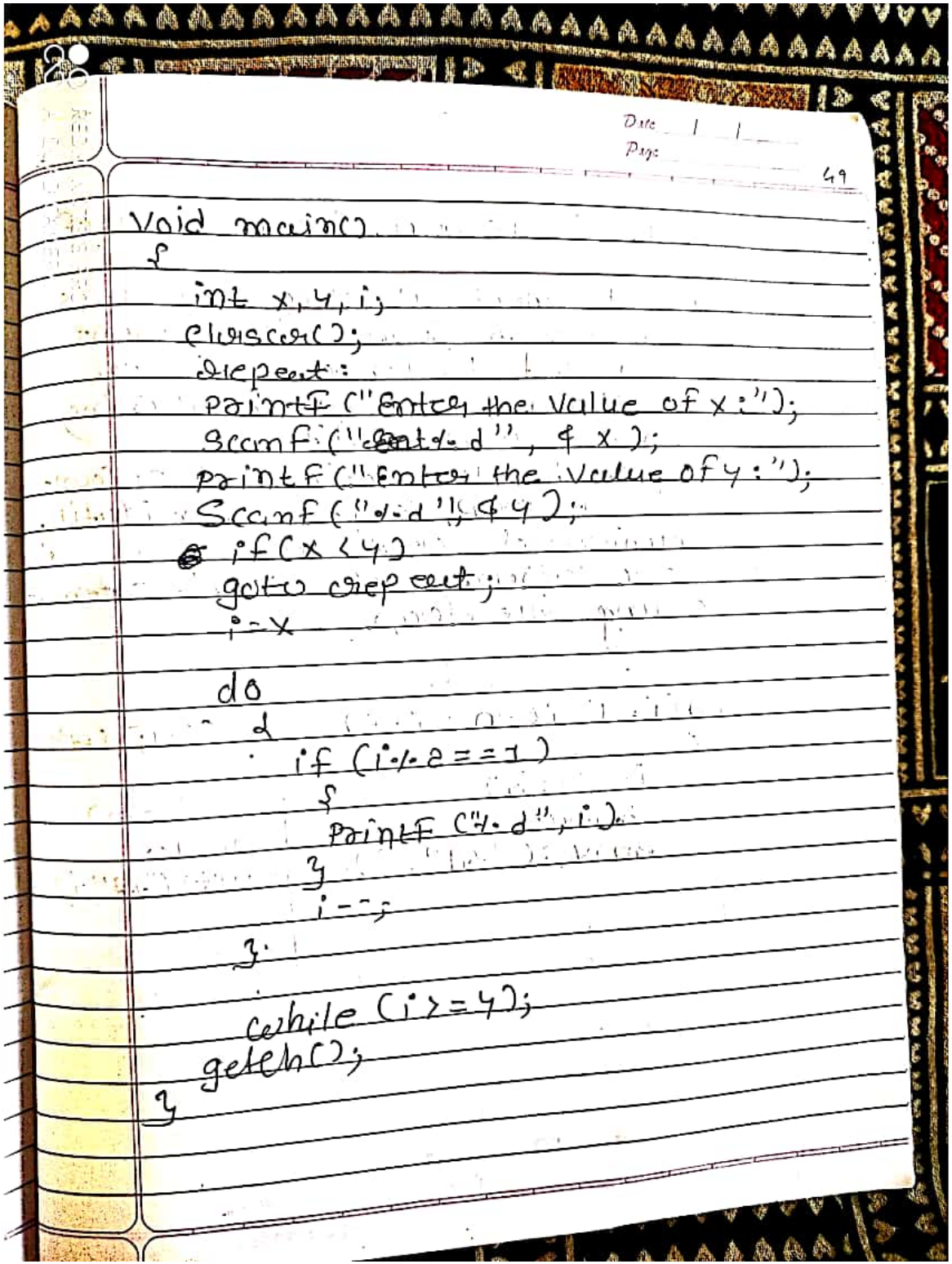

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```
Void main()
{
  int x, y, i;
  clrscr();
  repeat:
  printf("Enter the value of x:");
  scanf("%d", &x);
  printf("Enter the value of y:");
  Scanf("%d", &y);
  if(x<y)
   goto repeat;
   i=x

  do
   {
    if (i%2==1)
     {
      Printf("%d", i);
     }
     i--;
  }
  while (i>=y);
  getch();
}
```


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- when the break statement encounter inside the loop, loop is immidetily communicated and program control resume at next statement following the loop.

```
for(i=1; i<=n ; i++)
{
    if(i==30)
    break;
    printf("%d", i);
}
```

ob

```
for(i=1; ; i++)
{
    if(i==30)
    break;
    printf("%d", i)
}
```


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Countinue Statement :- In countinue sate.

it forces the next iration of loop to take place. instead of termenation like Break St.

```
for(i=1; i<=n; i++)
{
    if(i==30)
    continue;
    printf("%d", i);
}
```

Write a Program to check whether a number is even or odd using Switch statement

```
Void main()
{
    int no;
    clrscr();
    printf("Enter any number:");
    Scanf("%d", &no);
    Switch(no%2)
    {
    case 0: printf("no is even");
            break;
    case 1: printf("no is odd");
            break;
    }
    getch();
}
```


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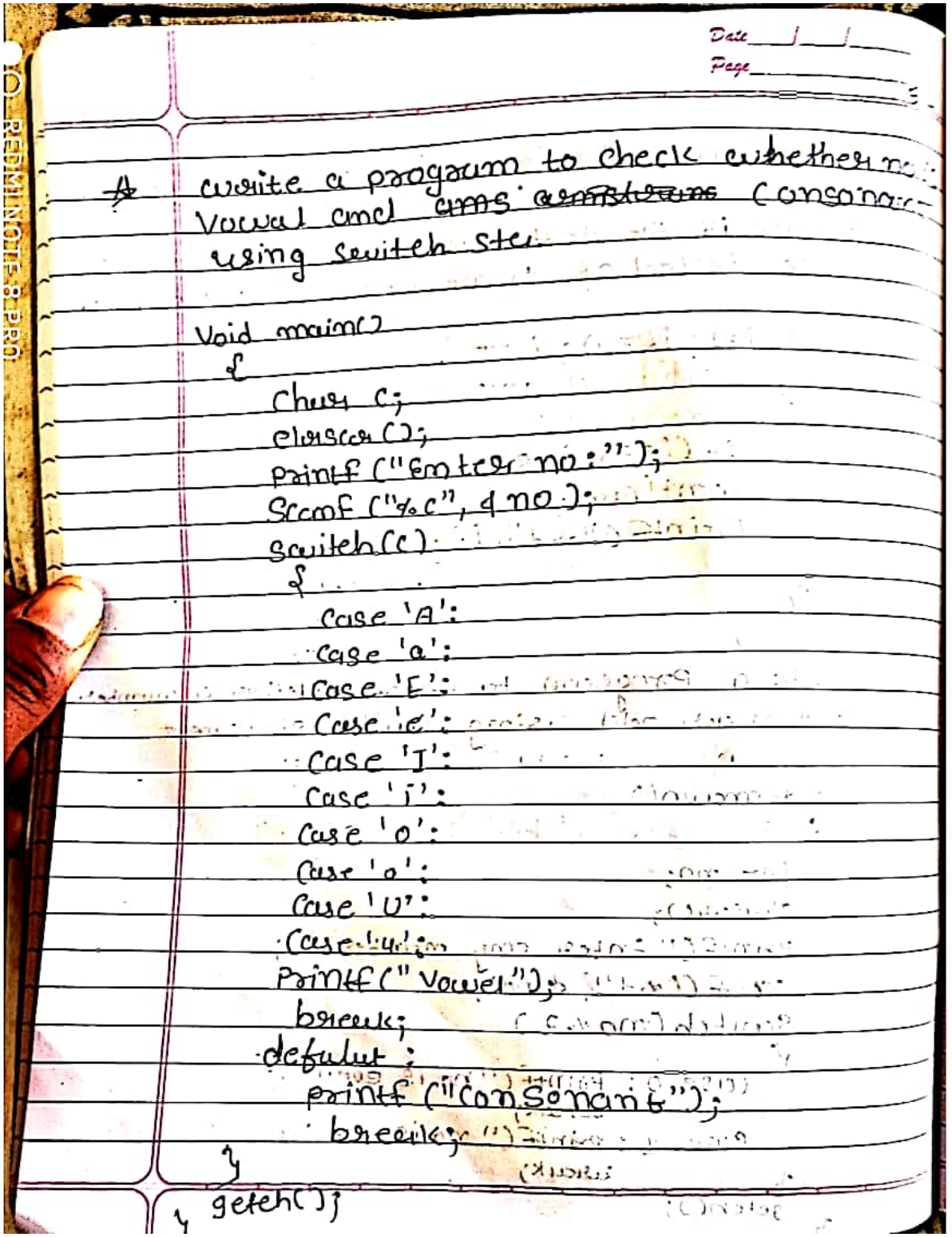

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* write a program to check whether no. Vowel and ~~consonants~~ Consonants using switch stc.

```
Void main()
{
    char c;
    clrscr();
    printf("Enter no:");
    Scanf("%c", &no);
    switch(c)
    {
      case 'A':
      case 'a':
      case 'E':
      case 'e':
      case 'I':
      case 'i':
      case 'O':
      case 'o':
      case 'U':
      case 'u':
      Printf("Vowel");
      break;
    default:
      printf("Consonant");
      break;
    }
getch();
}
```


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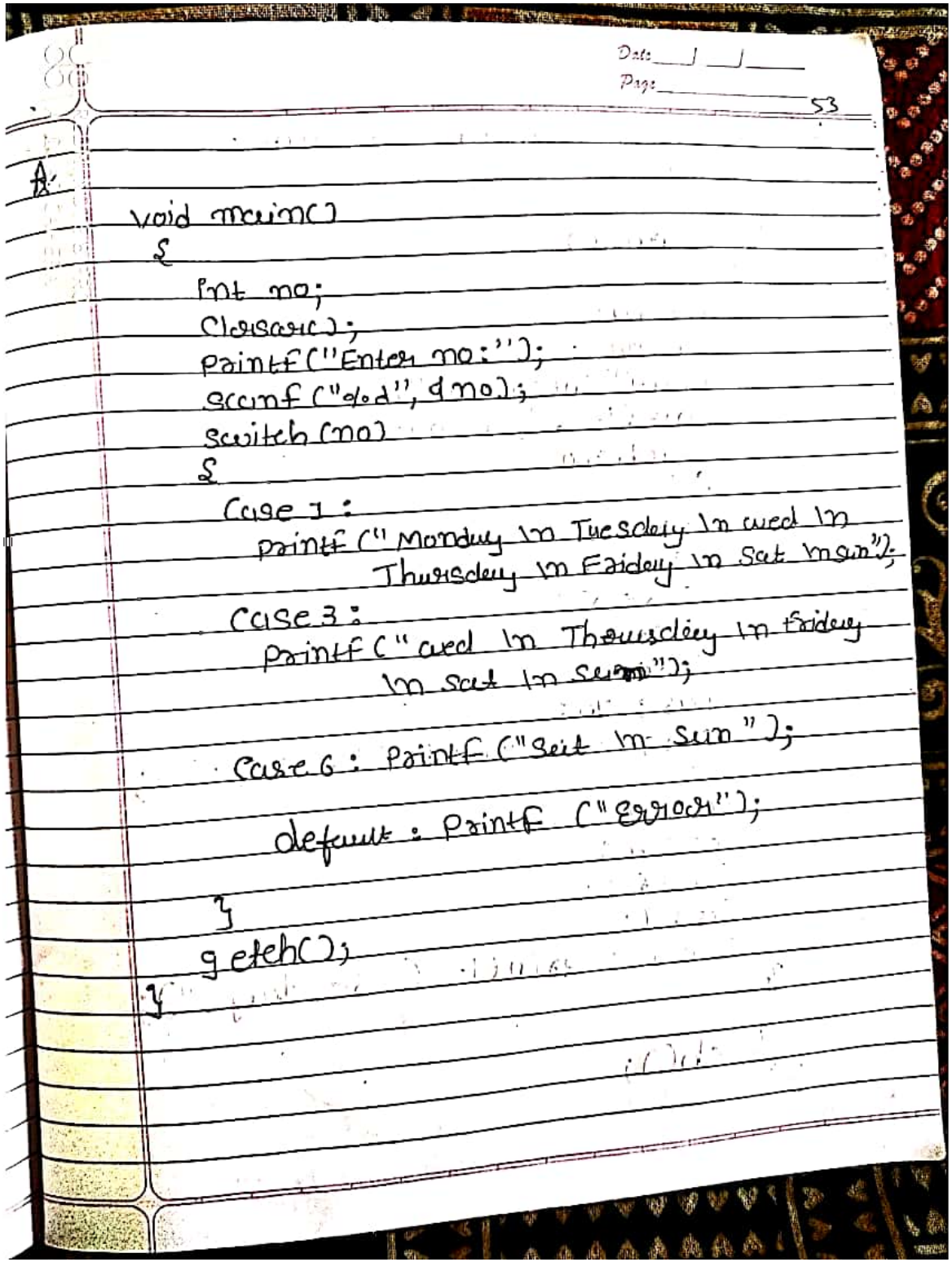

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A.

```
void main()
{
    int no;
    clrscr();
    printf("Enter no:");
    scanf("%d", &no);
    switch(no)
    {
     case 1:
        printf("Monday \n Tuesday \n wed \n
                Thursday \n Friday \n Sat \n sun");
     case 3:
        printf("wed \n Thursday \n friday
                \n sat \n sun");
     case 6: printf("Sat \n sun");
     default: printf("Errors");
    }
    getch();
}
```


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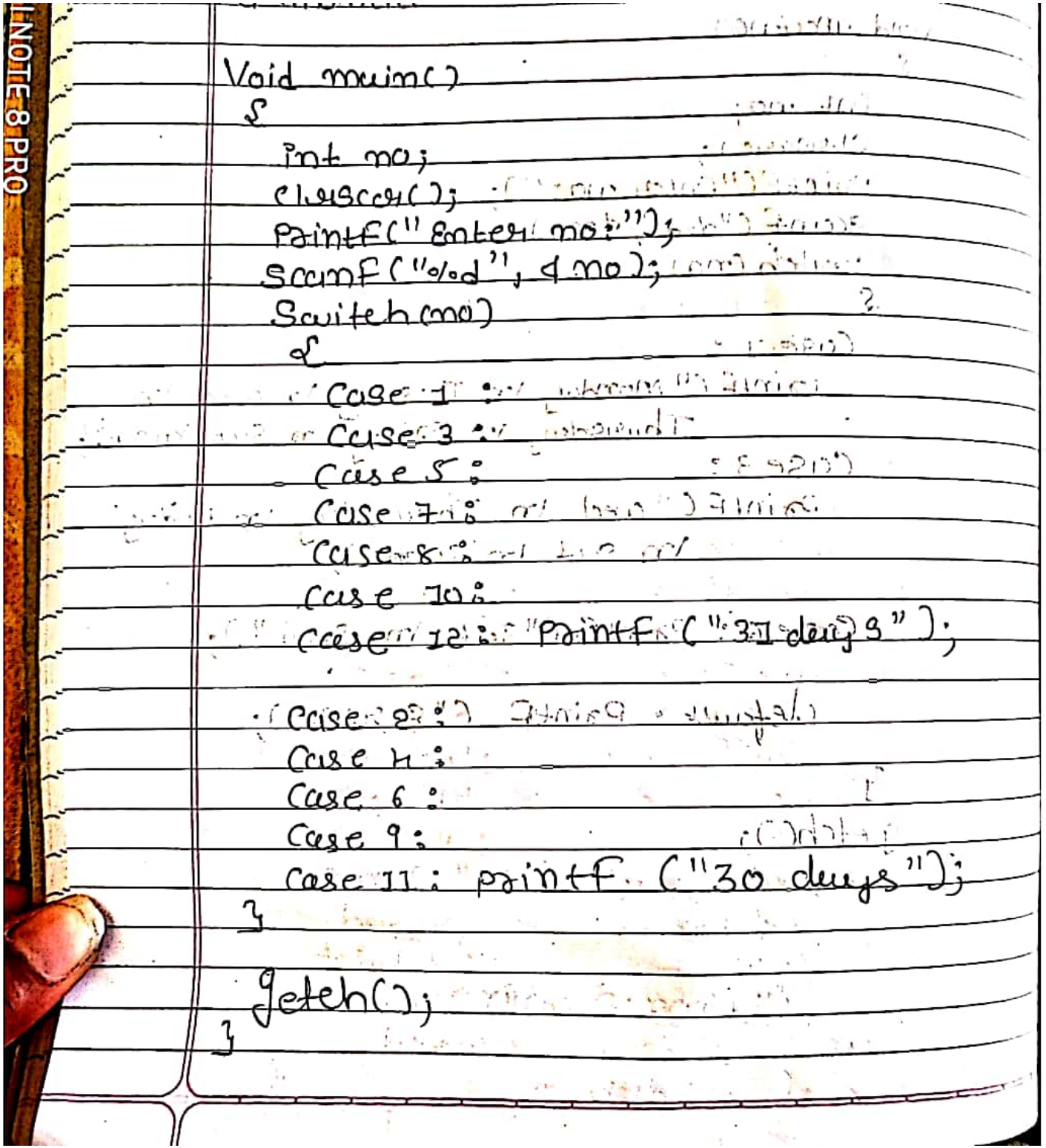

```
Void main()
{
  int no;
  clrscr();
  printf("Enter no:");
  scanf("%d", &no);
  Switch(no)
  {
   case 1 :
   case 3 :
   case 5 :
   case 7 :
   case 8 :
   case 10 :
   case 12 : printf("31 days");

   case 2 :
   case 4 :
   case 6 :
   case 9 :
   case 11 : printf("30 days");
  }

  getch();
}
```


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