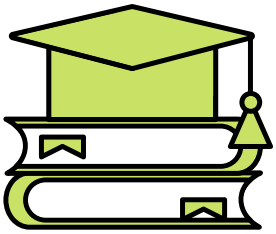

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GATE
Computer Science

Ravindrababu Ravula GATE CSE

Hand Written Notes

-: SUBJECT :-

C-programming

C-LANGUAGE

- **Intro programming in C:**

(1) All c programs must have a function in it called main.
(2) Execution starts in function main.
(3) comments start with /* and end with */.
or //.
(4) All C statement must end in a semicolon (;)

(5) the #include <stdio.h> statement instructs the C Compiler to insert the entire contents of file stdio.h in its place and compile the resulting file.

- **C-Tokens:** The smallest individual unit are known as c tokens.

C-haves 5-types of Tokens:
- keywords. (break, char, int, continue, default, do...)
- Identifiers. (user defined word; int money;
- Constants (100 is integer constant, a is character constant)
- operators. (A0-(+,-,*,/), 10-(&&, ||, !))
- special symbols. (separators-(,,;," "))

- **Data types:**
  - primary — (int, char, float, double)
  - Derived/user defined — (array, string, structure, union)

• Different types of modifier with their Range:

Types of Modifier	Size (in byte)	Range of values
int	2	-2^{16-1} to $+(2^{16-1}-1)$
signed int	2	-2^{16-1} to $+(2^{16-1}-1)$
unsigned int	2	0 to $(2^{16}-1)$
short int	2	-2^{16-1} to $(2^{16-1}-1)$
long int	4	2^{32-1} to $(2^{32-1}-1)$
float	4	$-(3.4E+38)$ to $+(3.4E+38)$
double	8	$-(1.7E+308)$ to $+(1.7E+308)$
char	1	-2^{8-1} to $(2^{8-1}-1)$
unsigned char	1	0 to $(2^{8}-1)$

• Types of operators:

(1) Arithmetic operators (+, −, *, /, %, ++, −−)

(2) Assignment operators (=, +=, −=, *=, etc)

(3) Relational operators (<, <=, >, >=, !=, ==)

(4) logical operators (&&, ||, !)

(5) Bitwise operators (&, |, ~, ^, <<, >>)

(6) Special operators (sizeof(), Ternary operator)

(7) Pointer Operators (* - value at address, & - Address of operator).

• Type Conversion :

(1) Implicit Type Conversion : There are certain cases in which data will get automatically converted from one type to another.

Example :
```
main(){
    float z;
    int x=10;
    char y='a';

    x = x+y
    z = x+1.0;

    print("x= %d", z= %f", x, z);
    return 0;
    }
```
Output : x= 10+97 = 107 (Ascii value of 'a' is 97)
z = 107+1.0 = 108.000000

(2) Explicit Type Conversion : (User defined)

Example:
```
int main(){

    double x = 1.2;

    int sum=(int) x+1
    pf("sum = %d", sum);
    return 0;
    }
```
output : sum = 2

- Expression —

① Lvalue :

→ Expression that refer to a memory location are called "Lvalue" expression.

→ An Lvalue may appear as either the left-hand or right-hand side of an assignment:

```
   Lvalue
b = 10
a = b
```

② Rvalue :

→ The term Rvalue refers to a data value that is stored at some address in memory.

→ can't appear on the left hand side.

- C variable types:
  - Local variable.
  - Global variable.

ex:

```
#include <stdio.h>
int x = 10;          ——→ Global variable.
void main() {
  int a = 5;  }
  int c;      }  ——→ Local variable.
  c = a + x;
  printf("Sum = %d", c)
  }
```

output : 5 + 10 = 15

- Operators in C:

	operators precedence	Associativity
✓	() [] → .	Left to Right
U	!, ~, ++, --, +, -, *, &, (type), size of	Right to Left
A	*, /, %	Left to right.
S	+ , -	"
C	<<, >>	"
	<, <=, >, >=	"
	==, !=	"
B	&	"
	^	"
	|	"
L	&&	"
	||	"
	?:	"
A	=, +=, -=, *=, /=, %=, &=, ^=, |=, <<=, >>=	Right to Left
C	,	Right to Left
		~~Left to Right.~~
		Left to Right

(to its member)

- Format specifiers:

10 %d → prints as decimal number.

------ %6d → prints as decimal number, at least 6 characters wide.

%f → prints as floating point.

%6f → prints as floating point, at least 6 characters wide

--- %.2f → prints as floating point, 2 characters after decimal point.

-------- %6.2f → print as floating point, at least 6 wide and 2 after decimal point.

%c → print as ascii characters.

%lf → format specifiers for double.

- **Character Input and output :**

getchar() :- it reads the next input character from a text stream and returns that as its value.

```
c = getchar()
```

the variable c contains the next character of input.

putchar() :- putchar prints a character each time it is called.

Example :

```
/* cppy input to output */

#include <stdio.h>
void main (void) {
   int c;
   c = getchar()
   while (c != EOF) {
      putchar (c);

      c = getchar();
   }
}
```

Linux commands

① vi filename.c

window

:wq → enter

② gcc filename.c

(complie this file)

③ ./a.out

(to run)

```
$ ./a.out <infile.> outfile.
```

- **Storage classes In c :** we have four types of storage classes in c :

(i) Auto storage class.
(ii) Register storage class.
(iii) static storage class.
(iv) Extern storage class.

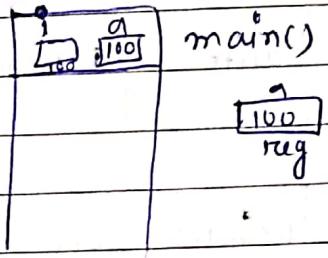
Storage Class	storage location	Default initial value	Declaration location	scope (visibility)	Lifetime (Alive)
auto	Memory	garbage	Inside a function / Block	With in the function/block	Until the function/block compute
register	CPU-register	garbage	"	"	"
static (local)	Memory	0	Inside the function/block	"	Until the program terminates
static (global)	Memory	0	outside all functions	Entire file in which it is declared	Until the program terminates
extern	Memory	0	outside all functions	Entire file plus other files where the variable is declared as extern	Until the program terminates

• examples-(on storage classes):

① int main(){
✗ register int i=10; → i value stored in register. but register have no address. so compiler error can be occure in this case.
int *a=&i;
printf("%d", *a);
return 0;
}
O/P: error.

② int main(){
✓ int i=10;
register int *a=&i;
printf("%d", *a);
return 0;
}
O/P: 10.

activation record:

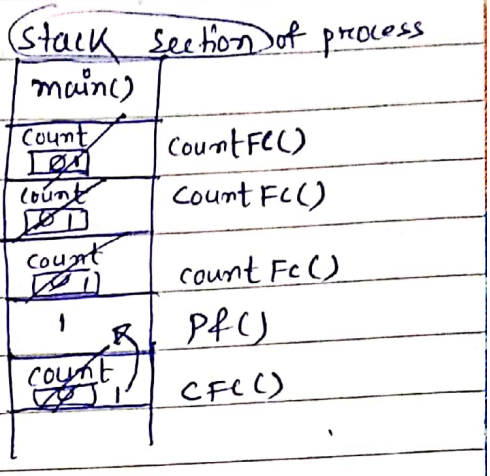


③ int main(){
✗ int i=10;
register static int i=10; → storing the value of i in two diff places ~~and~~ it not possible.
pf("%d", i);
return 0;
}
O/P: compiler error

④ (1)

```
int countFunctionCall (void)
{
Auto int count = 0;
    return ++count;
}

int main() {

1 countFunctionCall();
2 countFunctionCall();
3 countFunctionCall();

4 printf("%d times function is called", countFunctionCall());

  return 0;
}
```

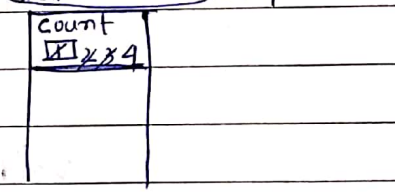
O/P : 1 — 1 times function is called.



④ (2)

```
int countFunctioncall (void) {
static int count;
  return ++count; }

int main() {
countFunctionCall();
countFunctionCall();
countFunctionCall();
printf("%d times function is called", countFunctionCall);
return 0;
}
```

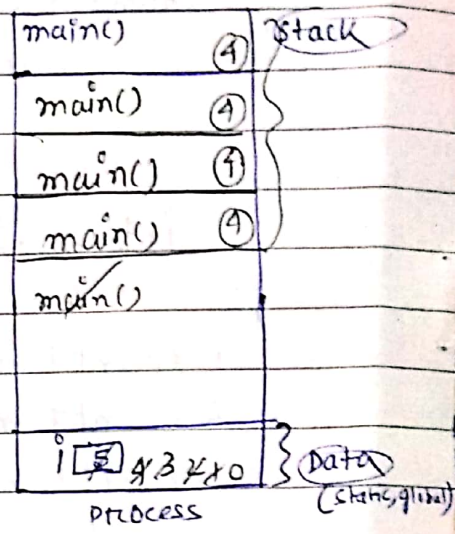
O/P : 4 — 4 times function is called.



(5) What is the output of the following program?

```
#include<stdio.h>
int main(){
1 static int i=5;
2 if(--i){ 3 main();
4 printf("%d",i);
}
}
```

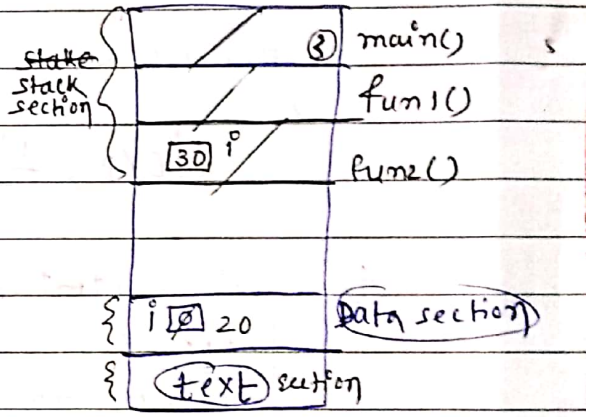
O/p: 0000



(6)

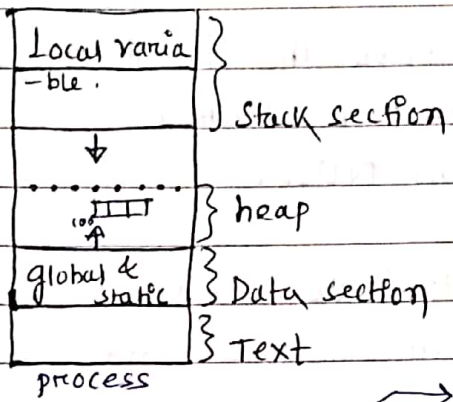
```
#include<stdio.h>
int i;
void fun1(){
i=20;
printf("%d",i);
}

void fun2(){
int i=30;
printf("%d",i);
}
int main(){
1 fun1();
2 fun2();
3 return 0;
}
```

O/p: 20 30



- Storage Management:

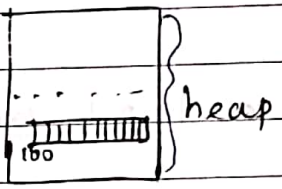
#include <stdlib.h>



① (void *)malloc (size_t n)
→ how many element want to store atleast
→ Unsigned data-type size ^16 bits.

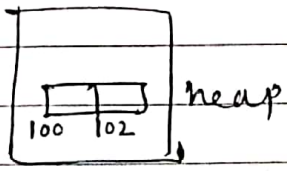
ex: void *malloc (sizeof(10))
→ It allocate in heap of 10 bytes, and return the pointer (starting address) of the allocated space.

```
int *i;
i = (int *)malloc (sizeof(int));
i++;
```



② (void *)calloc (size_t n, size_t size)
→ how many element you want to store
→ What is the size of each element

→ malloc and calloc always gives space in contiguous memory.



pointer of present space

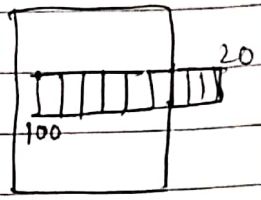
how many byte you want to increase.

100 20

③ void *realloc (void *ptr, size_t size)

→ it used to increase the size of space.

→ if space is not available then it returns NULL.



ex: void *realloc (100, sizeof(20))

→ pointer of allocated space and increase upto 20 byte.

100

④ void free (void *ptr)

→ free the present allocated space by passing the point of the location.

→ to avoide memory lick problem we use free.

- Input and output :

- formatted output = printf =

int printf (const char *format, arg 1, arg 2, ...)

Ex:

```
void main() {
    printf("%d", printf("%s", "ravindra"));
}
```

o/p : ravindra 8

Example:

```
/* Count number of set bits in x */

int bitCount(unsigned x) {
  int b;
  for (b = 0; x != 0; x >>= 1)
    if (x & 1)
      b++;
  return b;
}
```

x = 1 1 0 0 0 0 0 (1)

(1) 0 0 0 0 0 0 0 (1)

~~b is number of 1~~

b returns no. of 1.

b = x & 3

- Formatted input - scanf:

✓ int scanf(char, *format, ...)

✓ int sscanf(char *string, char *format, &arg1, &arg2, ...)

"10 20 30" %d %d %d

```
{ int day, month, year;
  scanf("%d %d %d", &day, &month, &year);
```

- File Input Output:

- File Handling in C: <stdio.h>

```
FILE *fp;
fp = FILE *fopen(char *name, char *mode)
int fclose(FILE *fp);
```

fopen() → creat a new file (or) open existing file.
fclose() → Closes a file
getc() → reads a character to a file.
putc() → write a character to a file.
fscanf() → reads a set of data from a file.
fprintf() → writes a set of data to a file.
getw() → reads an integer from a file.
putw() → writes an integer to a file.
fseek() → set the position to desire point.
ftell() → gives current position in the file.
rewind() → let the position to the begining point.

example:

```
#include <stdio.h>
void mind() {
FILE *fp;
int len;
fp = fopen ("file.txt", "r");

if (fp == NULL){
   printf ("Error opening file");
}
fSeeK (fp, 0, SEEK-END);
len = ftell (fp); → get file size by using it.
fclose(fp);
printf(" Total size of file.txt = %d byte\n", len);
}.
```

(fp, -2, 2) → go left.

int fseek (FILE *stream, long int offset, int whence)

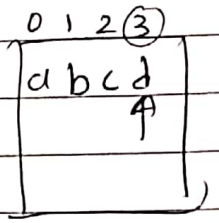
0 — Successful; Non-0 — fail

Whence

SEEK_SET	0	Begining of file.
SEEK_CUR	1	current position of file pointer.
SEEK_END	2	End of file.

(fp)

long int ftell (FILE *stream) ③ → current position return.



void rewind (FILE *stream)

- **puts(), gets()**

char *gets(s) (char *s) :- function reads a line from stdin (standard i/p) into the buffer pointed to by s until either a terminating newline (or) EOF.

int puts (s) (char *s) :- function writes the string s and a trailing newline to stdout.

```
#include <stdio.h>
void main() {
  char str[100];
  printf("Enter a string \n");
  gets(str);
  puts(str); }
```

o/p: R Nama
R Nama.

• Relationship between putc(), getc(), putchar(), getchar()

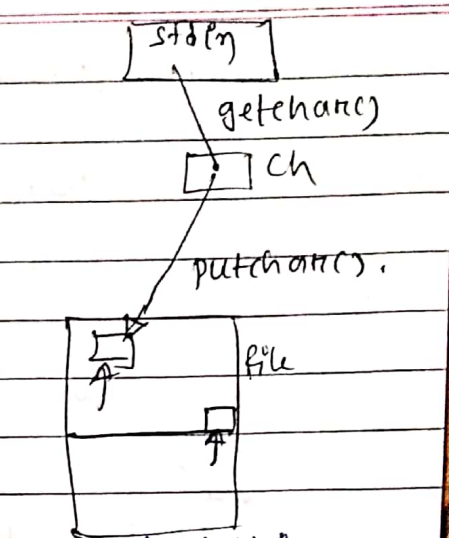
stdin
stdout
stderr
↳ linux environment

```
#include <stdio.h>
void main() {
  FILE *fp;
  char ch;
  fp = fopen("test.txt", "w");
  printf("Enter data");
  while((ch = getchar() or get(stdin)) != EOF) {
    putc(ch, fp)
  }
  fclose(fp);

  fp = fopen("one.txt", "r");
  while((ch = getc(fp)) != EOF) {
    printf("%c", ch);
    or putc(ch, stdout);
  }
}
```

• file reading and writing by using putc() and getc()

```
#include <stdio.h>
void main() {
  FILE *fp;
  char ch;
  fp = fopen("test.txt", "w");   // if this file is not present then it will be newly created.
  printf("Enter data");

  while((ch = getchar()) != EOF) {
    putc(ch, fp);
  }
```

```
fclose(fp);
fp = fopen("one.text", "r");

while ((ch=getc(fp)) != EOF) {
    printf("%c", ch)
}
fclose(fp);
}
```



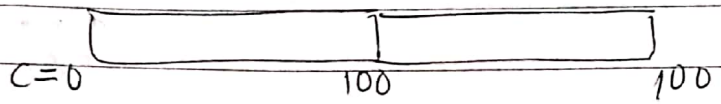
~~syntax of putc() :-~~

```
int putc(int c, FILE *fp)
int getc(FILE *fp)
```

- W.A.p to read stream of characters :

```
#include <stdio.h>
#include <stdlib.h>
#define DEFAULTSIZE 100

int ~~reg~~resize(char *p, int count);

void main(){
 int count = 0, capacity = DEFAULTSIZE;
 ~~capall~~ char *input;
     char ch;
 input = (char *) malloc (DEFAULTSIZE);
 while ((ch = getchar()) != EOF) {
    if (count == capacity) {
      input= resize(input, capacity);
      capacity = capacity + DEFAULTSIZE;

    input[count++] = ch;
}
    puts(input);
}
```

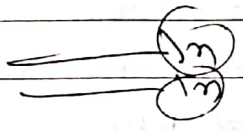
```
char *resize (char *p, int capacity) {
    return realloc (P, capacity + DEFAULTSIZE);
}
```



EOF → Ctrl + d (in linux)
Ctrl + z (in window)

- Write a c- programm to count inputlines.

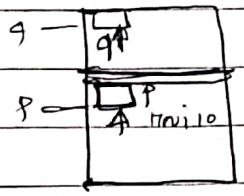
```
# include<stdio.h>

void main() {
  int lineCount, c;
  while ((c = getchar())) != EOF) {
      if (c == '\n')
          ++lineCount;
  }
  printf("%d", lineCount);
}
```



take i/p from user.

• W.A.P by using fscanf(), fprintf() =

```
# include <stdio.h>
struct emp {
    char name[10];
    int age;
};
void main(){
    struct emp e;
    FILE *p, *q;
    p = fopen("test.text", "a");      // append mode
    q = fopen("test.text", "r");

    printf("Enter name and age");
    scanf("%s %d", e.name, &e.age);

    fprintf(p, "%s %d", e.name, e.age);
    fclose(p);

    do {
        fscanf(q, "%s %d", e.name, e.age);
        printf("%s %d", e.name, e.age);
    } while (!feof(q));
}
```



feof(q)
- No zero — (EOF)
- 0 — (!EOF)

Page No :
Date :

- **C Flow control Statements :**

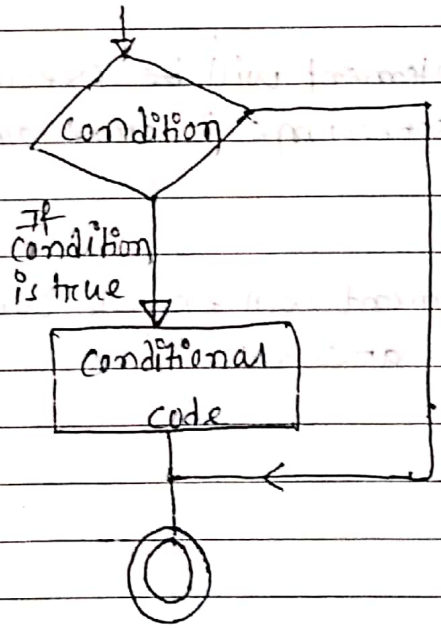
C provides two types of flow controls =

- Branching (deciding what action to take)
- Looping (deciding how many times to take a certain action)

- **Branching :**

① If statement is :

(i) if (Boolean expression)
{
statement /* statement will be executed if the boolean expression is true */.
}



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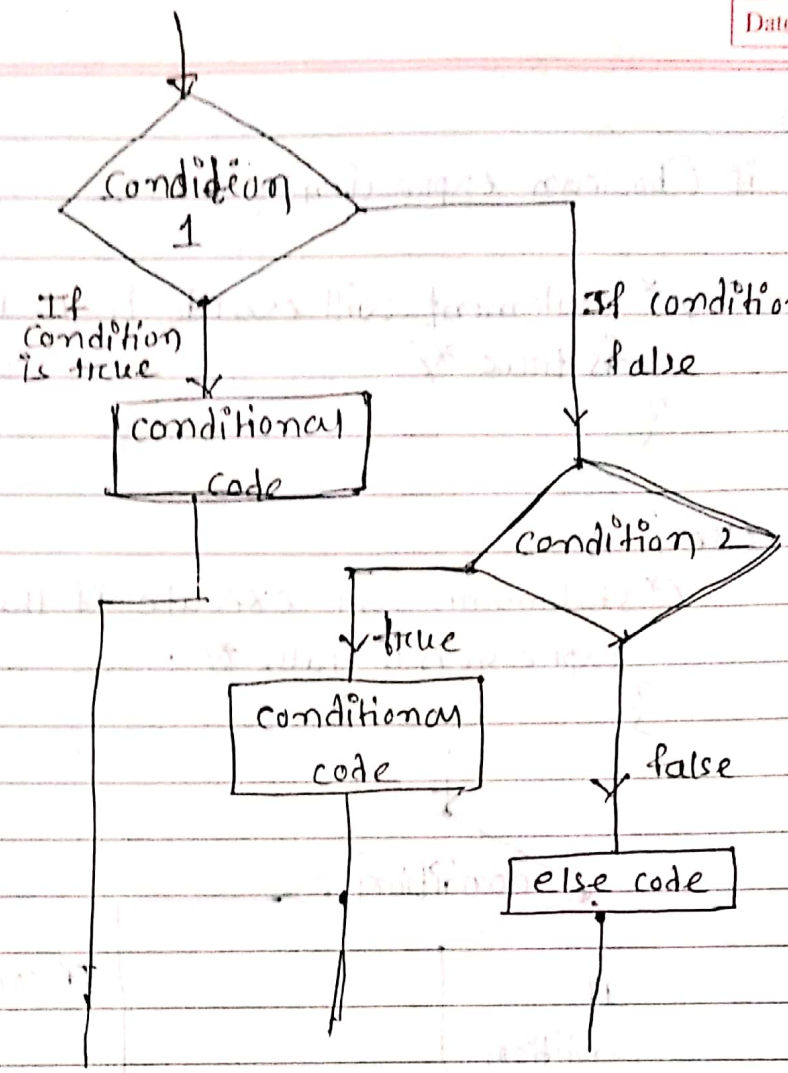
examples =

```
#include <stdio.h>
int main() {
  int a=10;
  if (a<20) {
  printf("a is less than 20");
  }
  return 0;
}
```

(ii)

```
if (boolean expression 1) {
    /* statements will execute if boolean
       expression 1 is true */
}
else if (boolean expression 2) {
    /* statement will be execute if boolean
       expression 2 is true and 1 is false */
}
else {
  /* statement will execute when both expression
     1 & 2 are false */
}
```

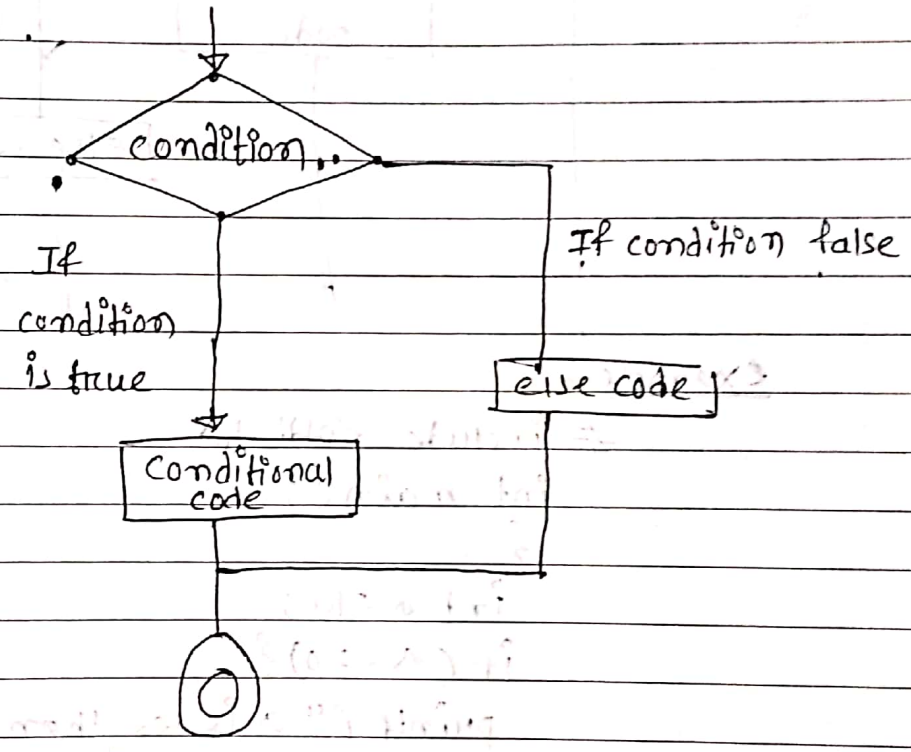


Example :

```
#include <stdio.h>
int main()
{
 int a = 10;
 if (a<20){
 printf ("a is less than 20"); }

 else if (a<100) {
 printf("a is between 20 and 100"); }

 else {
 printf ("a is greater than 100");
 }
 return 0;
 }
```

(iii)

```
if (boolean expression) {
    /* statement will execute if the boolean expression
       is true */
}

else {
    (* statements will execute if the boolean
       expression is false */
}
```



examples : (1)

```
#include <stdio.h>
int main() {
    int a = 10
    if (a<20)
    { printf("a is less than 20");
    else {
        printf("a is greater than 20"); }
    return 0; }
```

Example = (2)

W.A.p to check wether a given number is even or odd.

→
```
#include <stdio.h>
#include <conio.h>
void main() {

int integer;
printf("enter a integer:");
scanf("%d", &integer);

if (integer %2 == 0) {
   printf("~~int~~ even number:");

else
   printf("odd number:");

getch();
}
```

Example = (3)

W.A.p to check the largest number from given number.

→
```
#include <stdio.h>
#include <conio.h>

int main() {
int a, b, c;
clrscr();
printf("Enter three numbers:");
scanf("%d %d %d", &a, &b, &c);
```

```
if (a>b){
  if (a>c)
    {
      printf("%d is the largest number", a);
    }
}
else if (b>a){
    if (b>c) {
    {printf(" %d is the largest number", b);
     }

else
{ printf(" %d is the largest number", c);
  }

getch();
  return 0;
}
```

Page No :
Date :

(2) Switch Statement :

```
switch (control variable)
{
  case constant-1 : statement(s);
                    break;
  case constant-2 : statement(s);
                    break;
  :
  case constant-n : statement(s);
                    break;
  default : statement(s);
}
```

example : (1)

```
#include <stdio.h>
#include <conio.h>
void main() {
 int week-day;
 printf("enter weekday");
 scanf("%d" &weekday);

switch (weekday) {

 case 0 : printf ("Monday"); break;
 case 1 : printf ("Tuesday"); break;
 case 2 : printf ("Wednesday"); break;
 case 3 : printf ("Thrusday"); break;
 case 4 : printf ("Friday"); break;
 case 5 : printf ("saturday"); break;
 case 6 : printf ("sunday"); break; }
 default : printf ("invalid"); } }
```

Example-②

Write a program to make simple calculator.

→

```
#include<stdio.h>
#include<conio.h>
void
int main() {
  int operation;   /* char operation */
  double a, b;
printf("Enter an operation:\n");  /* Enter (+,-,*,/) */
printf("\n 1. addition. \n 2. substraction.
        \n 3. Multiplication. \n 4. division.");
scanf("%d", &operation);

printf("Enter two operands:");
scanf("%lf %lf", &a, &b);

switch(operator) {

case '+': printf("addition of a & b: %lf", a+b);
case '-': printf("sub of a&b: %lf", a-b); break; break;
case '*': printf("multi of a&b: %lf", a*b); break;
case '/': printf("division of a&b: %lf", a/b); break;

default: printf("Invalid choice");
  }
getch();
}
```

③ Conditional Operators (? :) = if else

Syntax:

expression 1 ? expression 2 : expression 3

- expression 1 is condition.
- expression 2 is statement followed if condition is true.
- expression 3 is statement followed if condition is false.

~~Example:~~

~~x = 2~~

~~(x < 3) ? printf("true") : printf("false");~~

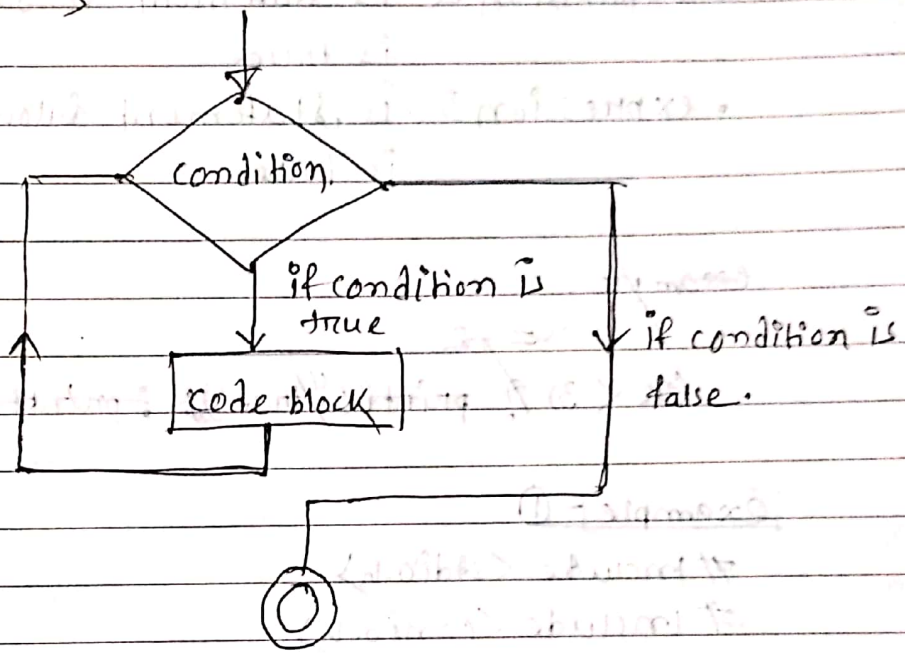
Example - ①

```
#include <stdio.h>
#include <conio.h>
{
int main() {
  int age;
  pf("Enter your age:\n");
  scanf("%d", &age);

  (age >= 18) ? printf("you are eligible to vote"):
                printf("not eligible to vote");
  return 0;
}
```

• Loop Control Structure :

(i) While loop :

```
while (condition)
{
  /* set of statements */
}
```

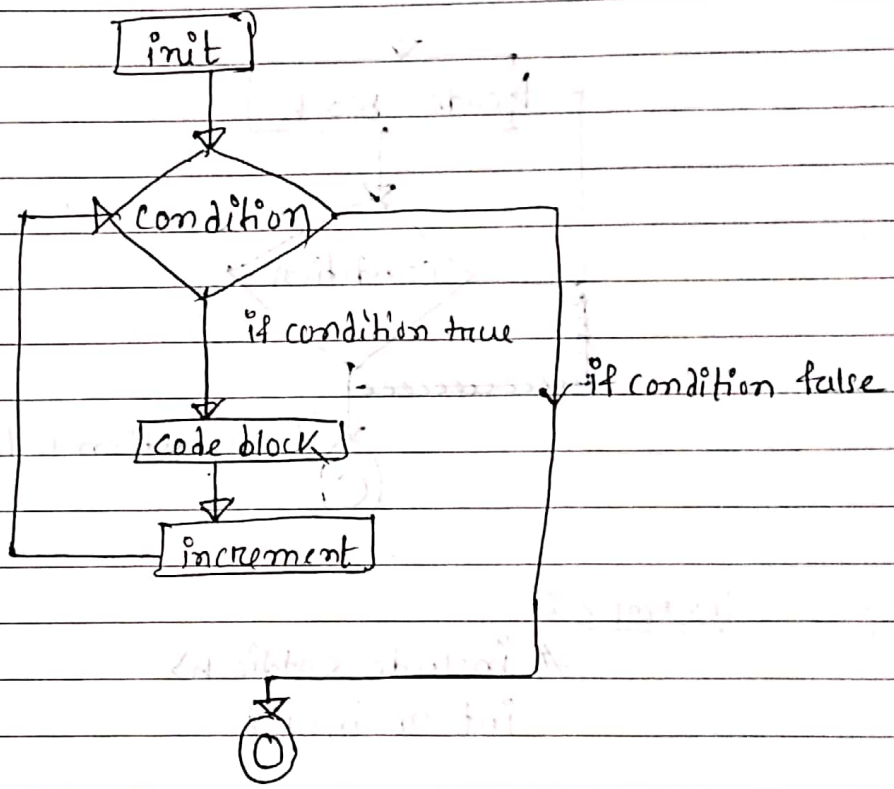


example = (stdio → standard i/o.)

```
#Include <stdio.h>
void main()
{
  int a = 10;
  while (a<20) {
    printf("a value: %d", a);
    a++;
  }
}
```

(ii) for - loop :

```
for (initialisation ; condition ; increment/decrement)
{
    conditional code ;
}
```

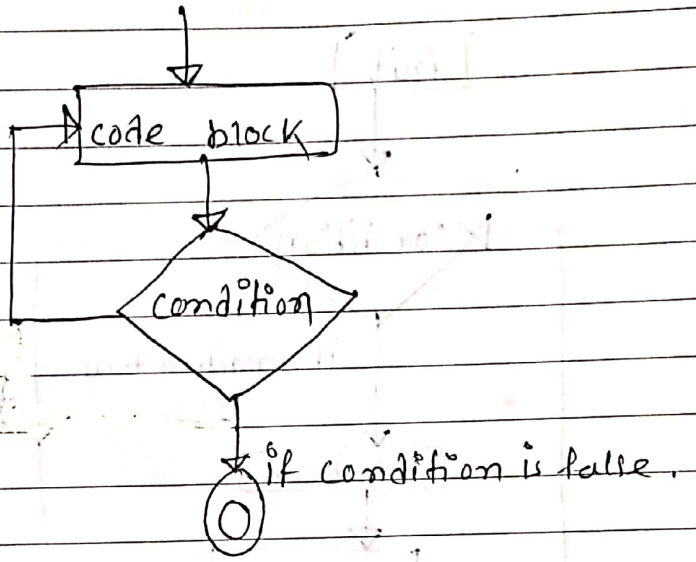


Example =

```
# include <stdio.h>
void main() {
  int a;

  /* for loop execution */
  for (a=0 ; a<20 ; a=a+1) {
     printf(" value of a : %d", a) ;
  }
}
```

(iii) Do-While loop :

```
do {

/* statements */
} while (condition);
```



example :

```
#include <stdio.h>
int main() {

    int a = 20;
    do {
      print ("a value: %d", a);
      a++
      } while (a<20);
    }
```

Page No :
Date :

examples =

(1) W.A.P to calculate the sum of natural numbers.

→

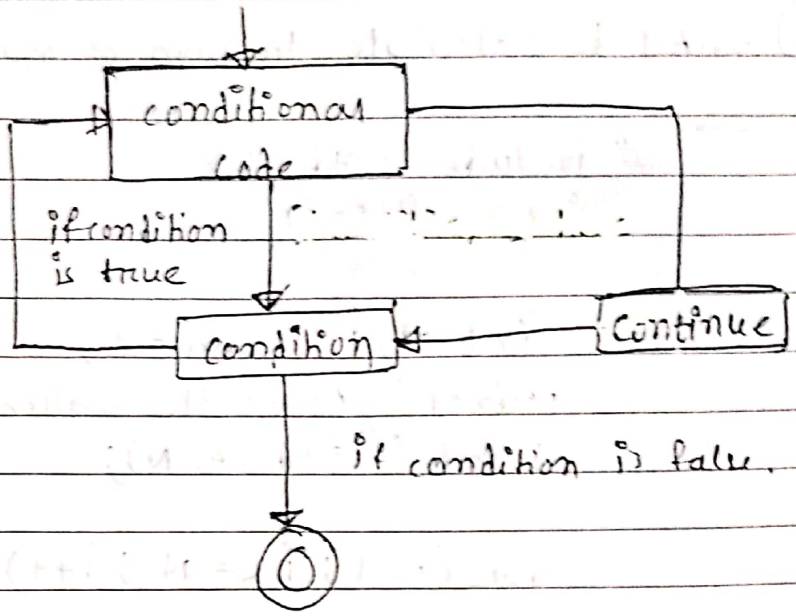
```
#include <stdio.h>
int main() {

    int N, i, sum = 0;
    printf("Enter the value of N:");
    scanf("%d", &N);

    for (i=1; i<=N; i++) {

        sum = sum + i;
    }
    printf("Sum of %d Natural number %d", sum);
    getche();
    return 0;
}
```

(2) W.A.P to read input untill user enter a positive integer.

→

```
#include <stdio.h>
Int main(){
    int n;
    do {
    printf("Enter a value:");
    scanf("%d", n);
    } while (n <=0)
    print("n value is %d", n);
    return 0;
}
```

- Continue statement =



example :-

write a program to read 15 integers from user and print sum of only positive integers.

→

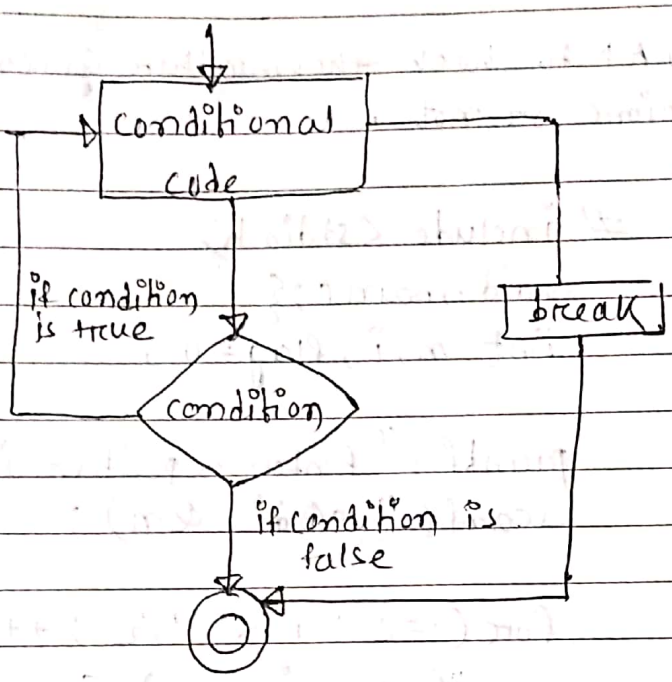
```
#include <stdio.h>
void main(){
 int i, n, sum = 0;
for (i=0 ; i<15 ; i++)
  {
    printf("Enter integer:");
    scanf("%d", &n);
      if (n<=0)
        continue;
    sum = sum + n;
  }
printf("sum of positive integers=%d", sum);
getch();
return 0;
}
```

Fortune

Page No :

Date :

- break statement :



Example :

WAP to read 5 integers until user enters a negative integer or number of integers read reaches to 15.

→

```
#include <stdio.h>
void main() {
    int n, count, i;
    for (i=0; i<15; i++) {
        printf("Read integer");
        scanf("%d", &n);
        if (n<0) {
            break;
        }
    }
}
```

Example)

① W.A.P to check whether given number is prime or not.

→

```
#include <stdio.h>
void main(){
int n, i, flag=0;

printf("Enter a positive integer:");
scanf("%d", &n);

for(i=2; i<=n/2; ++i){
    if(n%i==0){
        flag=1;
        break;
    }
}

if(flag==0)
    printf("%d is a prime number", n);

else
    printf("%d is not a prime number", n);
}
```

Page No :
Date :

Example-(2)

W.A.p to find factorial of a given number.

→

```
#Include <stdio.h>
void main(){
    int n, i;
    unsigned long long factorial = 1;

printf("Enter an integer : ");
Scanf("%d", &n);

if (n<0)
    printf("Factorial of negative numbers does not
                                    exist");
else {

for (i=2; i<=n; i++){
    factorial = factorial * i; }

printf("Factorial of %d = %llu", n, factorial);
    }

}
```

→ for big data type.

range (0 - $(2^{64}-1)$) — unsigned long long factorial = 1;

long long unsigned data type

Example - (3)

W.A.P to print half pyramid using '*'.

→

```
#include <stdio.h>
void main() {
    int i, j, numofrows;

    printf("Enter the no. of rows : ");
    scanf("%d", &numofrows);

    for (i=0 ; i<numofrows; i++) {

        for (j=0 ; j<=i ; j++) {

            print ("*");
        }

        print ("\n");
    }

}
```

numofrows = 5

i = 0, 1, 2, 3, 4

output:

```
*
**
***
****
*****
```

Page No :
Date :

example : (4)

W.A.P to count number of digits in an integer.

→

```
# include <stdio.h>

void main() {
    int n, count = 0;
printf("Enter an integer:");
Scanf ("%d", &n);
While (n != 0) {

    n = n/10;
    ++count;
}
printf("Number of digits: %d", count);

}
```

output:

Enter an integer: 142

Number of digits: 3.

$n = \frac{142}{10} = 14.2$ ⇓ int (1)

$n = \frac{14}{10} = 1.4$ ⇓ (1)

$n = \frac{1}{10} = 0.1$ ⇓ 0

count = 3

Page No :
Date :

example : (5)

W.A.P to Check Wheather given numbe is ~~amstrong~~ amstrong or not.

→

amstrong number means,

$371 = 3^3+7^3+1^3 = 371$ (yes)

$121 = 1^3+2^3+1^3 = 10$ (NO)

$1648 = 1^4+6^4+4^4+8^4 = 1648$ (yes).

→

```
#include<stdio.h>
#include<math.h>

void main(){
int number, originalNumber, remainder, result=0,
                                        n=0;

printf("Enter an integer");
scanf("%d", &number);

originalNumber = number;
while(originalNumber !=0){
    originalNumber/=10;
    ++n;
}

originalNumber =number;
while(originalNumber !=0){
remainder = originalNumber %10;
result = result + pows(remainder, n);
originalNumber /=10; }
(result==number) ? printf("Armstrong Number");
                 printf("Not Armstrong Number");

}
```

1412
n=3

1 4 2

When i/p = 142
corrects
0+2
2^3+4^3
$2^3+4^3+1^3$
$=8+64+1$
$=73$
output:
NO
armstrong
number

Example - (6)

W.A.P to to pint the following pattern :

```
   *
  ***
 *****
*******
```

→

```
#include <stdio.h>
void main(){
int i,j,k, numofRows ;
printf(" Enter Number of Rows :");
scanf("%od", &numofRows);

for (i=1; i<=numofRows(4); i++) {

    for (j=i; j<numofRows(4); j++) {
        printf(" ");
    }
    for (k=1; k<(i*2); k++) {
        printf("*");
    }
    printf("\n");
  }
}
```

working procedure =

(4-1) - - - * - - - (2*1-1)
(4-2) - - * * * - - (2*2-1)
(4-3) - * * * * * - (2*3-1)
(4-4) * * * * * * * (2*4-1)

i = 1 2 3 4

```
   *
  ***
 *****
*******
```

Example = (7)

W.A.P to check whether given number is palindrome or not.

→ like, -121
-11311
-2442

n = 121
n % 10
R = 0 × 10 + 1 = 1
= 1 × 10 + 2 = 12
= 12 × 10 + 1 = 121

→
```
#include <stdio.h>
void main(){
int n, reversedNumber=0, remainder, originalNumber;
printf("Enter a number:");
scanf("%d", &n);
originalNumber=n;

while(n!=0){
    remainder = n % 10;
    reversedNumber = reversedNumber * 10 + remainder;
    n/=10;
}
(originalNumber == reversedNumber) ? printf("palindrome") : printf("not a palindrome");
}
```

(heart)

Page No :
Date :

example (8)

W.A.p to generate fibonacci sequences given first number and second no. of sequence.

→ 0, 1, 1, 2, 3, 5, 8, 13, ...

f s sum

```
#include <stdio.h>
void main() {
int first, second, sum, num, counter = 0;

printf("Enter the number of terms:");
scanf("%d", &num);
printf("Enter first number:");
scanf("%d", &first);
printf("Enter second number:");
scanf("%d", &second);

printf("Fibonacci series %d %d", first, second);

while (counter < num) {
    sum = first + second;
    printf("%d", sum);
    first = second; second = sum;
    counter++;
}
}
```

(4) (4)

heart.

working = num = 3, counter = 0, 1, 2 | first = 2, second = 3

2 | 3 | 5 | 8 | 13

f s

- **Functions :**

Syntax of function defination :

```
return-data-type function-name (data-type var1, data-type var2 ...)
                                (argument)
{
/* function-body */
}
```

- **Return type :-**

A function may return a value. Some functions may perform the desired operations without returning a value. In this case, the return-type is the keyword **void**.

example: Multiplication of two number using function.

```
#include <stdio.h>
#include <conio.h>
int Multiplication(int, int);
int main()                                   → function name
{ int i,j,K;
  clrscr();
  pf("enter two value:");
  sf("%d %d",&i,&j);
  K = multi(i,j);                            → actual parameters.
  pf("%d \n",K);
  return 0; }

int Multi(int x, int y){                     → formal parameters.
int a; a = x * y; return a; }
```

function body

fun-ction name