INTRODUCTION TO COMPUTING—2006

Time : 3 Hours *Full Marks : 70*

Group–A
(Multiple Choice Questions)

1. **Choose the correct alternative in each of the following :**

10 × 1 = 10

(a) The function ftell ( )

(i) reads a character from a file, (ii) reads an integer from a file, (iii) gives the current position in a file, (iv) none of these.

(b) Members of a union use—(i) different storage locations (i) same storage locations (iii) no storage locations (iv) none of these.

(c)
```
main (  )
{
int x = 7, y = 5 ;
x = y++ + x++
y = ++y  +++x ;
printf ("%d%d", x, y) ;
}
```
Output :

(i) 12 14 (ii) 12 20 (iii) 9 7 (iv) 12 19.

(d)
```
main ( )
{
int sum, i ;
for (i = 0 ; i < = 10 ; 1++)
{
if (i%2) continue ;
sum = sum + i ;
}
printf ("%d", sum) ;
}
```
Output :

(i) 55 (ii) 30 (iii) 23 (iv) 42

(e)
```
# define SQR(A) A*A
main (  )
```

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```
{
int x = 5 ;
int y ;
y = 4*SQR (x – 3) ;
printf (“%d”, y) ;
}
```

Output :

(i) 8 (ii) 64 (iii) 16 (iv) – 52

(f) ALU is a part of a

(i) memory (ii) CPU (iii) output device (iv) input device.

(g) ASCII value of ‘A’ is

(i) 97 (ii) 65 (iii) 48 (iv) 67

(h)
```
main ( )
{
int i = 2 ;
switch (i)
{
case 1 : printf (“One”) ;
case 2 : printf (“Two”) ;
case 3 : printf (“Three”) ;
default : printf (“Error”) ;
}
}
```

Output :

(i) One Two Three Error (ii) Two (iii) Two Three Error (iv) Two Three

(i)
```
main ( )
{
int i, j ;
for (i = 0,j = 5 ; i < j ; i++, j++) ;
printf (“%d%d”, i, j) ;
}
```

Output :

(i) 3 2 (ii) 0 5 1 4 2 3 (iii) Error (iv) Infinite loop.

(j) A 32-bit microprocessor has the word length equal to

(i) 2 bytes (ii) 1 byte (iii) 4 bytes (iv) 8 bytes.

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Ans. 1. (a)(iii) ; (b)(ii) ; (c) None (output : 1 4 2 1) ; (d) None (sum is not initialised) ; (e) None (output 2) ; (f)(ii) ; (g)(ii) ; (h)(iii) ; (i)(iv) ; (j)(iii)

Group–B

Note : (i) Each answer should not exceed 50 words.

(ii) Answer any three questions.

2. Answer any five of the following questions in brief : 3 × 5

(a) Write a complete C program to generate a Fibonacci series.

(b) Write a C program to find the sum of 2 matrices.

(c) Write a C program to convert Centigrade to Fahrenheit and vice versa.

(d) Using ternary (conditional) operator, write a 'C' program to find the largest of three numbers.

(e) Differentiate between Do-while and While statements with suitable examples.

(f) Differentiate between Break and Continue statements with examples.

(g) What is dynamic memory allocation? Write about malloc and calloc functions.

Ans. (a)

```
   # include <stdio.h>
   # include < conio.h>
Void main ( )
   {
   int n, x = 1, y = 1, z, i ; clrscr (  ) ;
Printf (“\n Enter the no. of terms you want to display in Fibonacci series \n") ;
Scanf (“%d”, & n) ;
Printf (“\n The fiboracci series is\n”) ;
Printf (“%d%d”, x, y) ; // First two terms
for (i = 0 ; i < n – 2 ; i ++)
   {
      z = x + y ;
      y = x ;
      x = z ;
Printf (“\t% d”, z) ;
   }
getch ( ) ;
   }
```

or,

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```
Void main ( )
    {
    int n, x = 1, y = 1, z ; clrscr ( );
Printf (“\n Enter the value upto which you want to print \n”)
Scanf (“%d”, & n) ;
Printf (“\n The fiboracci series is \n”) ;
Printf (“%d%d”, x, y) ;
while (x<=n)
    {
        z = x + y ;
        y = x ;
        x = z ;
Printf (“%d”, z) ;
    } getch; ( ) ;
    }
```

Ans. (b)

```
# include < stdio.h>
# include <conio.h>
# define ROW 5 // Row dimension equal to 5
# define COL 5 // Column dimension equal to 5
void main ( )
    {
    int a [ROW] [COL], b [ROW] [COL],
        C [ ROW ] [ COL ], i, j ; clrscr ( ) ;
Printf (“\n Enter the matrix a ....\n”) ;
for (i = 0 ; i < ROW ; i++) // input to matrix a
    {
for (j = 0 ; j < COL ; j++)
    {
Print (“\n Enter the element a [%d] [%d] = ”)
Scanf (“% d”, & a[i] [j]) ;
    }
{
Printf (“\n Enter the matrix b ... \n”) ;
For (i = 0 ; i < ROW ; j++) // input to matrix b
```

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```
   {
for (j = 0 ; j < COL ; j++)
   {
Printf ("\n Enter the element b [%d] [%d]");
Scanf ("%d", & b[i] [j]) ; }}
Printf ("\n The a matrix is \n") ;
for (i = 0 ; i < ROW ; j++) // output to matrix a
   {
for (j = 0 ; j < COL ; j++)
   {
Printf ("\t % d", a[i] [j]) ;
   }
Printf ("\n") ;
   }
Printf ("\n The b matrix is \n") ;
For (i = 0 ; i < ROW ; i++)
   {
For (j = 0 ; j < COL ; j++)
   {
Printf ("\t % d", b[i] [j]) ;
   }
Printf ("\n") ;
   }
For (i = d ; i < ROW ; i++) // for sum of two matrix C_ij = a_ij + b_ij
   {
For (j = 0 ; j < COL ; j++)
   } }
C [i] [j] = a [i] [j] + b[i] [j]
   }
Printf ("\n The output matrix c is \n") ;
For (i = 0 ; i < ROW ; i++)
   {
For (j = 0 ; j < cOL ; j++)
   {
Printf ("\n % d", c [i] [j]) ;
```

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```
    }
Printf ("\n");
    }
getch ( ) ; }
```

Ans. (c) Refer to the answer Question No. 2(c) of year 2005.

Ans. (d) To know about ternary operator See the answer Question No. 6(c) of year 2002.

```
# include < stdio.h >
# include < conio.h >
void main ( )
   {
   int a, b, c, large_num ;
   clrscr ( ) ;
Printf ("\n enter the number a \n") ;
Scanf ("%d", 8a) ;
Printf ("\n enter the number b\n") ;
Scanf ("%d", & c) ;
large_num = (a > b) ? ((a > c)? a : c) : ((b > c)? b : c)
Printf ("\n The largest number is % d", large_num) ;
geten ( )
   }
```

Ans. (e) Refer to the answer Question No. 4(c) of year 2002.

Ans. (f) Refer to the answer Question No. 10(iii) of year 2004.

Ans. (g) Refer to the answer Question No. 9(e) of year 2005.

3. (a) With a suitable block diagram, briefly explain the major components and their functions of any conventional computer.

(b) State the basic features of any structured programming language.

Ans.(a). Refer to the answer Question No. 3(a) of year 2002.
Ans. (b) Refer to the answer Question No. 3(c) of year 2002.

4.(a). What is the type casting? What is the automatic type conversion?

(b) Explain unary operation with example.

(c) Write a C programe to check whether a given number is prime number or not.

Ans. (a)

```
Void main ( )
   {
```

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```
    int x = 5, y = 2 , z;
        float z ;
        Clrscr ( ) ;
        z = x/y ;
Printf ("% f", z) ;
getch ( ) ;}
```

The above c-program will give the output i.e., z = 2.000000. Because c compiler does not know that integer integer division can produce float. So, we have to type cast. **Type costing is a process by which we can** force fully cast the data type to the variable. According to above program we can type cast x as follows.

```
void main ( )
    {
        int x = 5, y = z ;
            float z
        z = (float) x/y ; └── type casting
Printf ("% f", z) ;
    }
```

In type casting there is a need to store a value of one type into a variable of another type. In such situations, we must cost the value to be stored by proceeding it with the type name in parentheses. The syntax is :

```
type variable 1 = (type) variable 2 ;
        type casting
```

It is possible to asign a value of one type to a variable of a different type without a cast. This is know as automatic type conversion.

In semantic analysis phase of compiler the automatic type conversion is done. Generally lower byte variable is converted to upper byte variable. In above program after type casting the x variable, y variable automatically converted from int to float. After that float, float division will produce float. Automatic type conversion also called implicit type conversion.

Ans. (b) Unary operator takes one operand to operate. For example ++ (increment) and -- (decrement) operator.

++ and – – both are unary operators and are used in the following form :

```
++ m or m ++ (m is single operand) ;
│           post increment
└preincrement
```

++ m or m++ is equivalent to

m = m + 1 ;

– – m or m – – (m is single operand)

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Predecrement post decrement

– – m or m – – is equivalent to m = m – 1 ;

other unary operators are !, – (unary minus)

+ (unary plus), ~ etc.

Ans. (c)

```
# include < stdio.h >
# include < conio.h >
void main (  )
    {
        int n , i, flag = 0 ;
Printf ("\n enter the number \n") ;
Scanf ("% d", & n) ;
for (i = 2 ; i < = n – 1 ; i++)
    {
        If (n % i = = 0)
        {
            flag = 1 ;
            break ;
        }
}
If (flag = = 0)
Printf ("\n The given number is prime \n") ;
else
Printf ("\n The given number is not prime \n") ;
getch (  ) ;}
```

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5. What is recursion? Write a recursive C function to find the factorial of a positive integer that is received as argument to the function. 5

Ans. Refer to the answer Question No. 4(b) of year 2003.

```
# include < stdio.h >
# include < conio.h >
unsignd int factorial (int) ; // function protyping
Void main (   )
    {
Unsigned int n ; fact ;
Printf ("\n enter the positive number \n") ;
Scanj ("% u", & n) ;
fact = factorial (n) ;
Printf ("\n The factorial of % n is % u\n", n, fact) ;
    geten ( ) ;
    }
unsigned int factorial (unsigned int P)
    {
        If (p = = 0)
        return (1) ;
        else
    return (n * factorial (n – 1)) ; }
```

6. Explain "Call by by value" and "call by referecne" mechanism for passing arguments into a function call in general. Develop a function in C that will swap (exchanged) the value of two integer variables passed as arguments. Also write the main program. 5

Ans. Refer to the Answer Question No. 8.(a) of year 2003.

Group–C

Note : Answer any ***three*** of the following questions. 3×15= 45

7. (a) What is a file ? Write the instructions in C for creating a file. 2+4

(b) Write a complete C programe to copy file fl.dat assuming fl.dat is available in your current working directort. 9

Ans. (a) File is a collection of records. In other point of view file is a logical storage unit by which it gives an abstraction to user about the physical storage device. For example x.dat, x.doc, x.txt etc.

File name extension

```
# include < stdio.h >
# include < conio.h >
Void main ( )
  {
  FILE * fpr ;                    // FILE is a structure, fpr is a
                                  structure pointer or File pointer
fpr = fopen ("File name", "mode") ;
// mode may be
r/w/a/r+/w+/a+/rb/wb
etc (read/write/oppend etc)
// input to file/working to file
f close (fptr) ;}
```

fopen ( ) function open a file of specified file name according to mode (read/write/apper n etc). After working on file close the file by fclose ( ) function.

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Ans. (b) Refer to the answer Question No. 9.(a) of year 2003 and Question No. 11(ii) of year 2004.

8. (a) What is structure in C? How is it declared?

(b) Declare a structure temple having members of appropriate type
branch
name
roll No
marks in 8 subjects.
Write a C program to create an array of 30 structure variables and read all the members of each variable. 9

Ans. (a) Refer to the answer Question No. 10(ii) of year 2004 and Question No. 4(a) of year 2005.

Ans. (b)

```
# include < stdio.h>
# include < conio.h >
struct student
   {
      int rollno ;
      char name [ 20 ] ;
      chor branch [ 20 ] ;
      float marks [8] ;
      } s [30] ; //array of 30 structure variables.
Void main ( )
   {
   int i ;
   for (i = 0 ; i < 30 ; i ++)
   {
Printf (“\n enter the roll no of student \n”)
Scanf (“%d”, & s [ i] . roll no) ;
Printf (“\n enter the name of student \n”)
Scanf (“%S” , s[i] . name) ; //gets (s[i].name) ;
Printf (“\n enter the branch of student \n”) ;
Scanf (“\s”, s[i].branch ; // gets (s[i].branch)
Printf (“\n enter the marks of 1st subject \n”) ;
Scanf (“%f’, & s[i].marks[o]) ;
Printf (“\n enter the marks of 2nd subject \n”) ;
Scanf (“%d” , + s[i]. marks [i]);
Printf (“\n Enter the marks of 3rd Subject \n”);
Scanf (“% f ”, & s[i].marks [2]) ;
Printf (“\n enter the marks of 4th subject”) ;
Scanf (“% f ”, & s[i].marks [3]) ;
```

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```
Printf ("\n enter the marks of 5th subject") ;
Scanf ("%f", & s[i].marks [4]) ;
Printf ("\n enter the marks of 6th subject \n") ;
Scanf ("%f", & s[i].marks [5]) ;
Printf ("\n enter the marks of 7th subject \n") ;
Scanf ("% f", & s[i].marks [6]) ;
Printf ("\n enter the marks of 8th subject \n") ;
Scanf ("% f", & s[i].marks [7]) ;
getch ( ) ;
    }
```

link float ( ) *It is special function fral till help to link the float data type. Generally turbo compiler requires this function to take the input of float type. Otherwise problem may create for taking float type input ∞.

```
    {
float a = 0, * ptr ;
    Ptr = ∞ a ;
    * Ptr = a ;
    }
```

9. (a) Distinguish between recursion and iteration. 5

(b) Write a reccursive program to compute factional of a number read from keyboard. 10

Ans. (a)

Recursion	Interation
1. When a function called by itself then it is called recursion.	1. The process of repeatedly executing a block of statements is known as iteration or loop.
2. Recursion requires base value condition to terminate.	2. Interation or loop requires terminating condition to terminate.
3. Generally two type of recursion—(i) Direct (ii) Indirect.	3. Generally two type of loop or iteration—(i) Entry centrol (while) (ii) exit control (do-while).
4. Recursion requires stack, it increase time and space complexcity of program.	4. Generally iteration requires less space and complencity w.r.t. recusion.

5. Example,
X ( ) {
If (condition) → Base value condition
x ( ) ;
}
	5. Example,
	for (initialization ;
	terminating condition ; increa.../decrenat)
	executable statement ;
	}

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Ans.(b). Refer to the Answer Question No. 5 of the year 2006.

Note : one mistake in problems, factional will factorial.

10. (a) Write short notes on the following :

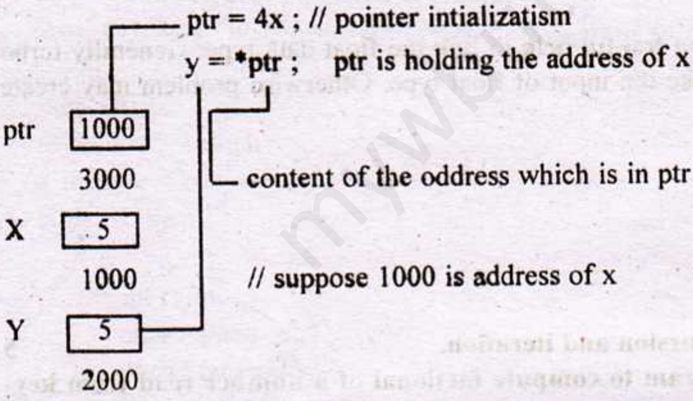
(a) Pointers in C (b) Bitwise operators (c) Operating system.

Ans.(a) Pointer is a variable who holds the address of an another variable.

For example

int *ptr ; *ptr is a pointer variable holding the oddres of an integer variable

int x = 5, y ;



ptr = 4x ; // pointer intializatism

y = *ptr ; ptr is holding the address of x

content of the oddress which is in ptr

// suppose 1000 is address of x

Pointer can be incremented or decremented

Refer to the answer 10(i) of year 2004.

Ans. (b) Refer to the Answer 12(ii) of year 2003.

Ans. (c) Refer to the Answer 2(a) of year 2002.

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