The Cabinet
Information and Decision Support Center
Information Technology Institute

Date: January, 2005
Time: Allowed: 2 Hours.
Notes: Open Book Exam

Sample Exam

Data Structures & Algorithms (using C Programming Language) Exam
Model Answer

Question #1: (20 Marks, Each Point 2 Marks).
Choose the correct answer (Choose all that apply):

1. D) *int num=2;*
2. D) *'2'=='2'*
3. A) 0
4. C) *#define MAX 10*
5. A) *gets()*
6. B) *int *ptr;*
7. A) ** ptr;*
8. D) -6
9. B) First is size, second is particular element
10. E) *pEmp->Salary=90.5F;*

Question #2: (10 Marks, i = 3 Marks, ii = 4 Marks, iii = 3 Marks).

```
#include <stdio.h>

/* (i) */
long int factorial(int);

void main(void)
{
   int n = 10;
   int f;

   f =factorial(n);

   printf("\n factorial of %d  = %d", n,f);
}
```

System Console

```
/* (iii) */
Factorial of 10 = 3628800
```

Note: If you used *int* instead of *long int* Incorrect value for the 10! may result Due to Over Flow Error at runtime!!!!, Because the factorial of 10! = 3628800 which is greater than the maximum value that can be held by *int* (32767 for 2byte integers) on 16 bits Sytems) but will run correctly on *on 32 bits sytems (2147483647 for 4 bytes integers), so try to avoid that possible problems by declating the factorial function to return long int or better unsigned long int for more size.*

```
/* (ii) */
long int factorial(int n)
{
  if(n < 0)
    return -1;          /* -1 indicates Error for invalid value of n < 0 */
  if(n == 1)
    return 1;           /* 1! = 1 */
  return n*factorial(n-1);  /* n! = n*(n-1)! */
}
```

```
int n = 10;
int f;

f =factorial(n);

printf("\n factorial of %d  = %d", n,f);
}
```

(ii)

Question #3:

Design and implement the following functions using C Programming Language (Solve only 2 questions from A, B, C, and D):

a) Write a function RemoveVowels(string) that removes vowels from a word (represented by a string).

b) Write the algorithm then the program that reads in the distance ***d*** between the departure air port and the destination air port, the aero plan speed ***aeros*** , the wind speed ***winds*** ,computes and displays the traveling time for an aero plan ***tg*** (going with wind), and ***tb*** (back against wind).

c) Write a function to perform the algorithm for searching a list of numbers in an array. State the searching technique that you will use in your function (Use one only of the following search algorithms in the function such as Sequential Search, or Binary Search).

d) Consider the following structure

```
struct Part {
    char pno[10];
    char pname[20];
    char pdescription[50];
    int pquantity;
    };
```

Declare an array of the above structure and write a program to perform the following.

i. Read the array size.
ii. Read the array.
iii. Output pno, pname for parts with pquantity < 100

****

Printf("Good Luck");

e. 6

9. What's the difference between the 3 s in these two expressions?

int num [3] ;

num [3] =5;

a. First is particular element, second is type
b. First is size, second is particular element
c. First is particular element, second is array size
d. Both specify array elements
e. Both specify array size

10. *struct Employee*
{
int Number;
char Name[21];
float Salary;
};
*struct Employee *pEmp=(struct Employee *) malloc(sizeof(struct Employee));*
Referring to the sample code above, which of the following statements is correct?
a) Salary=90.5F;
b) pEmp[Salary]=90.5F;
c) pEmp::Salary=90.5F
d) pEmp.Salary=90.5F;
e) *pEmp->Salary=90.5F;*

Question #2:

a) The following C Program uses a function called factorial() to calculate the factorial of an integer variable. Please complete the missed parts in the indicated places as follows:

i. factorial() function prototype.
ii. factorial() function body.
iii. Program output on the system console.

Note: Implement factorial function as a recursive function

```
#include <stdio.h>

(i)

void main(void)
{
```

System Console

(iii)

C language Quiz

Information Security Dept. – Intake 27

Name: ..... Duration: 10 mins.

Q1. Choose the correct answer (Only one):

1- What are the values of x and y at the point marked /*values here*/ in the following program?

```
void fun(int *x)
{
 int y;
 y = *x+2;
 *x = 2**x;
}
int main(void)
{
 int x = 10,y = 11;
 fun(&x);
 fun(&y);      /*values here*/
}
```

a) x = 10, y = 11
b) x = 20, y = 22
c) x = 20, y = 11
d) x = 10, y = 22

2- Assuming that *spread [ ]* is a one – dimensional array of type *int*, which of the following refers to the value of the third element in the array?

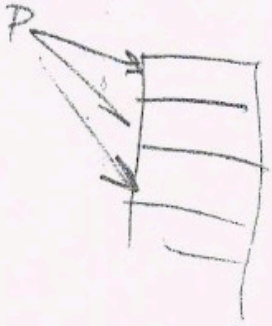
a) *(spread+3)
b) *(spread +4)
c) spread+2
d) spread+4

arrayname + Value → add
* arrayname + value → value

3- The output of this code is:

```
#include<stdio.h>
int main()
{
   unsigned int val=5;
   printf("%u  %u",val,val-11);
 return(0);
}
```

(a)Compile-Time error
(b)5 -6



b. *const MAX=10;*

c. *#define MAX 10*

d. *Both B and C*

e. *Non of the above*

5. Which is more appropriate for reading in a multiword string?

a. *gets()*

b. *printf()*

c. *scanf ()*

d. *puts ( )*

e. All of the above

6. Which one of the following statements is the correct way to define a pointer?

a. *Int_ptr x;*

b. *int *ptr;*

c. *int ptr;*

d. *int &ptr;*

e. *int ptr;*

7. Which are correct ways to refer to the variable *ch*, assuming the address of *ch* has been assigned to the pointer ptr?

a. ** ptr;*

b. *int *ptr;*

c. *&ptr;*

d. **ch;*

e. *ptr;*

8. Considering the following code fragment:

```
int x =2 , y = 4, z = 6;
z += x*x-2*x*y+y*y-10;
printf("%d",z);
```

The output of the printf() function will be:

a. 76
b. 12
c. zero
d. –6

C language Quiz

Information Security Dept. – Intake 27

Name: ..... Duration: 10 mins.

Q1. Choose the correct answer (Only one):

1- How many "Hello" words are displayed by this code?

```
for(i=0;i<10;++i)
 for(j=10;j>i;--j)
  printf("Hello");
```

a) 100
b) 10
c) 50
d) 55

2-What will be the output of the following program :

```
int main()
{
  char str[]="%d";
  int val=25;
  printf(str,val);
  return(0);
}
```

(a)Compile-Time Error
(b)Run-Time Error
(c)25
(d)None of these

3- What will be the output of the following program :

```
int main()
{
  int m=10,n=20;
  printf("%d %d %d",m/* m-value */,/* n-value */n,m*/* Compute m*n */n);
  return(0);
}
```

(a)Run-Time Error
(b)10 20 200
(c)Compile-Time Error
(d)None of these

4- What will be the output of the following program :

```
int main()
{
   int i,j;
   for (i=1; i<=3; i++)
      for (j=1; j<3; j++)
         {
          if (i == j)
            continue;
          if (j % 3) > 1)
            break;
          printf("%d  \t",i);
         }
  return(0);
}
```

(a)Compile-Time Error
(b)2 3
(c)3 4
(d)None of these

5- What will be the output of the following program :

```
#include<stdio.h>
#include<conio.h>
#define swap(a,b) temp=a; a=b; b=temp;
int main()
{
   int a=53,b=6;
   swap(a,b);
   printf("a=%d b=%d",a,b);
  return(0);
}
```

(a)Compile-Time Error
(b)a=53 b=6
(c)a=6 b=53
(d)None of these

What will be the output of the following program :

```
# include "stdio.h"
#include<conio.h>
void main()
{ float x;
clrscr();
x=1;
switch(x)
{ case 1:
printf("the value of the variable is 1 \n");
 case 2:
printf("the value of the variable is 2 \n");
break;
}
getch();
}
```

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Data Structures & Algorithms (using C Programming Language) Exam
Model Answer

Question #3: (30 Marks, 2 points each of 15 Mark).

Design and implement the following functions using C Programming Language (Solve only 2 questions from A, B, C, and D):

The student can provide any solution that fulfills the design requirements mentioned in the specific questions under consideration.

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Printf("Good Luck, Total Mark = 60, Passing Score 60%");

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Data Structures & Algorithms (using C Programming Language) Exam

Question #1:

Choose the correct answer (Choose all that apply):

1. Which of these C statements initializing variables?
   a. *num==2;*
   b. *int num;*
   c. *num<2;*
   d. *int num=2;*
   e. *Both A and D*
2. Which of the following expressions is true ?
   a. *1>>2*
   b. *'a'>'b'*
   c. *1==2*
   d. *'2'=='2'*
   e. *All of the above*

3. If num is –42, what is the value of this conditional expression?

   (num <0) ? 0 : num *num;

   a. *0*
   b. *-42*
   c. *1764*
   d. *–1764*
   e. *non of the above.*

4. If an array has been defined this way:

   ```
   /* MAX Declaration Statement*/
   float prices [MAX];
   ```

   The following code will read values into all the elements of the array:

   ```
   for (j = 0; j< =MAX; j++)
   scanf ("%f",&prices[j] );
   ```

   For the previous code to work what should be written instead of the commented line above?

   a. *int MAX=10;*

(c)5 65530
(d)None of these

Q3. What's the output of this code?

```
#include <stdio.h>
#include <conio.h>
#define PI 3.14
#define circle_area(x)  (PI*x*x)
struct simple
{int a; float c;};

struct complex
 {  int a[20];
    float c;
    struct simple s;
    struct simple sa[4];  };

void main()
{
float area1;
struct complex comp1;
float * temp =&comp1.sa[2].c;
clrscr();
comp1.s.a=2;
comp1 sa[2] c=22 34;

area1= circle_area(2+comp1.s.a);

printf("the value of the pointer is %f\n",*&*temp);
printf("the area of the circle is %f",area1);
getch();
 }
```

C Programming Exam

Q.1 True or False: (10 Marks)

1) printf and scanf are Considered C Keywords (
2) C Language allow implicit casting from **(void *)** to **(int *)** (
3) Stack memory management is automatic ,while Heap memory management is Manual (
4) Casting from **int** to **long** considered safe casting regardless of sizeof **int** Data type (
5) Global variables are initialized automatically to its default values (
6) This is a valid function signature
int [] FunctionName (int X , int *ptr) (
7) malloc and free are allocating and de-allocating Data in the stack (
8) Maximum number of array dimensions allowed in C Language is Three Dimensional Array (
9) All operators are left associative except Assignment Operator (=) is right associative (
10) Struct in C is considered a User Defined Data Type (

Q.2 Choose the correct Answer (Choose One Answer Only): (45 Marks)

1)
```
#include<stdio.h>

void main ()
{
 int CharVariable ;

 scanf("%d",&CharVariable);

 printf ("%c",CharVariable);
}
```

Assuming User will write 65 and Press Enter
What is the output of this Program?

a) 65
b) 0x41
c) A
d) Compiler Error
e) Linker Error

2)
```
#include<stdio.h>
#define Size 7]

void main ()
{ int Arr[Size,i,Sum=0;
 clrscr();

 for ( i = 13 ; i >6 ; i--)
 {
     printf ( "Enter Value# %d :- ", 14-i);
     scanf("%d",&Arr[14-i]);
     Sum+= Arr[14-i];
 }
```

```
        if ( X == 10)
            return X;
        return RecFun(++X);
    }
    void main ()
    {
        printf("%d", RecFun(5));
    }
```

What is the output for this program?

a. 0
b. 5
c. 9
d. 10
e. Infinite loop
f. Compilation Error

15)
```
#include<stdio.h>
#include<conio.h>

void main ()
{
    int X = 64 ;
    printf("%d",X>>3);
}
```

What is the output for this program?

a. 0
b. 8
c. 16
d. 64
e. 3
f. Compilation Error

Q.3 Answer the following question: **(5 Marks)**

List the **Four possible ways** to return ***two*** values (Float Data Type) from a function
I need to write a function that will evaluate the Divide and Reminder Results for two input numbers
(The following is just a fraction of the function code)

```
[          ] MyFunction ( float F1 , float F2 [          ]
{
[          ] F1 / F2 ;

[          ] F1 % F2;
}
```

c) Infinite Loop
d) Compilation error
e) None of the above

5)
```
#include<stdio.h>
void main ()
{
      int i = 1.5;

      switch (i)
      {
      case 1: printf("(");
      case 2: printf("\\");
      case 3: printf("|");
      case 4: printf("/");
      case 5: printf(")");
     }
}
```

Output from this Program:
a) Compilation error
b) (
c) \\
d) (\\|/)
e) (\|/)
f) \|/)

6)
```
#include<stdio.h>
#include<string.h>
#include<alloc.h>

void main ()
{
    char *Str[3];
    int i ;

    for ( i =0; i< 3; i++)
        Str[i] = (char *) malloc (sizeof(long double));

    strcpy(Str[0],"ABC");
    strcpy(Str[1],"abc");
    strcpy(Str[2],"aBc");

    printf ("%d",strcmpi(*Str,Str[1]));
}
```

Output from this Program:
a) Compilation error
b) Runtime Error

```
    printf ("Sum = %d",Sum);
}
```

Assuming User Input will be as follows: 1 2 3 4 5 6 7 8

What is the output of this Program?

a) Compiler Error
b) 7
c) 28
d) 0
e) None of the above

3)
```
#include<stdio.h>

void main ()
{
    int X=7 ;
    do
    {
        printf("Enter New Number :- ");
        scanf("%d",&X);
    }
    while ((X >=1)||(X<=5));
    printf ("X = %d",X);
}
```

What is the expected output from this program if the user intended to input this sequence of numbers: 1 2 3 4 5 6 7 8

a) X = 7
b) X = 28
c) Logical Error
d) Compilation Error
e) None of the above

4)
```
#include<stdio.h>
void main ()
{
    int i = 0 ;

    for ( ;;)
    {
        printf ("%d:",++i);
        if ( i == 7) break;
        i++;
    }
}
```

Output from this Program:

a) 1:2:3:4:5:6:7:
b) 0:1:2:3:4:5:6:7:

```
struct Person
{
    int Id;
    char Name[100];
};
void main ()
{
    struct Person P , *Ptr = NULL;
    P.Id = 1; strcpy(P.Name,"Aly");

    if (( Ptr != NULL)&&(Ptr->Id !=0))
        printf("%s",Ptr->Name);
    else
        printf("NA");
}
```

What is the output from this program?

a. Memory Garbage
b. Run Time Error (Null Pointer assignment)
c. Compilation Error
d. ALY
e. NA

11)

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

int* FunABC ()
{
    int *A = (int *) malloc(sizeof(int));
    *A = 7;
    (*A)++ ;
    return A;
}
void main ()
{
    int A ;
    A = *FunABC();
    printf("%d",A);
}
```

What is the output from this program?

a. 8
b. 7
c. 0
d. Memory Garbage
e. Run Time Error (Null Pointer assignment)
f. Compilation Error

```
void main ()
{
    int X = 7 , Y = 3 ;
    SWAP ( X , Y );
    printf ("%d %d %d %d",A,B,X,Y);
}
```

What is the output from this program?

a. 7 3 3 7
b. 7 3 7 3
c. 3 7 7 3
d. 3 7 3 7
e. 0 0 7 3
f. 3 7 0 0

9)

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

struct Point
{
    int XPos;
    int YPos;
};

void main ()
{
    struct Point *P;
    P = (struct Point*)malloc(sizeof(struct Point));
    P[0].XPos = 10 ;  P[0].YPos = 20 ;
    printf("%d", P->XPos+P->YPos);
    free(P);
}
```

What is the output from this program?

a. 30
b. 10
c. 20
d. Memory Garbage
e. Run Time Error
f. Compilation Error

10)

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

c) 0
d) 32
e) -32

7)
```
#include<stdio.h>
#include<string.h>
#include<conio.h>

void main ()
{
    char *Name=NULL,Str[10];
    int i ;
    Name = Str;

    for ( i =0; i< 10; i++)
    {
     Name[i] = getche();
     if ( Name[i]== 0X0D)
     {
         Name[i]='\0';
         break;
     }
    }
    printf ("Hello %s",Name);
}
```

After starting this Program Assuming, the End User will hit this sequence of keys:

A
B
C
Enter

What is the output from this program?

a) Compilation error
b) Runtime Error (Null Pointer Assignment)
c) Hello ABC#$%^&*5
d) Hello ABC
e) Hello

8)
```
#include<stdio.h>
int A,B;

void SWAP ( int X , int Y)
{
    int Temp;    Temp = A ;
    A = B ;      B = A;
}
```