CS101 MIDTERM - SPRING'2011

NAME:

ROLL NUMBER:

Read the questions properly and attempt all of them. It may seem that you can finish off the exam in short time but I would warn you for doing that – Answers are tricky.

For multiple choice questions, you score -1 for incorrect answer and +5 for correct answer. Question 3 and Question 4 are for 20 points and Q 29, Q 30 and Q 31 are for 10 points with no negative marking.

Question 1. Choose one of the following multiple choice options for the pair of statements below.

(a) It is legal to have two functions whose signatures/prototypes differ
(b) It is legal to have two functions whose signatures/prototypes differ only by their return types.

A. TRUE, FALSE
B. TRUE, TRUE
C. FALSE, FALSE
D. TRUE,TRUE

Question 2. Choose one of the following multiple choice options for the pair of statements below.

a. Because arrays are passed to functions as references, the called functions can modify the element values in the caller's original arrays.

b. There are ways to pass arrays to functions as references, so that the called functions cannot modify the element values in the caller's original arrays.

1. TRUE, FALSE
2. TRUE, TRUE
3. FALSE, FALSE
4. FALSE,TRUE

Question 3. Write code for the following: (20 Points)

A number is said to be perfect if it is equal to the sum of its divisors except itself. For example, 6 and 28 are both perfect numbers because: $6 = 1 + 2 + 3$ $28 = 1 + 2 + 4 + 7 + 14$

In the space below, complete the method `isPerfect()`, which returns `1` if its argument is a perfect number, and `0` otherwise. Assume the method correctly receives a positive integer argument .

```
boolean isPerfect(int n)
```

Question 4. Write a routine to remove duplicates in an integer array. You may modify the array that is passed to the function inside it. The function should return the number of unique values in the array and these unique integers should be stored in the first "i" locations of the integer array.

Question 5 Study the **Program A, Program B and Program C** below and determine their outputs. Then, answer the multiple choice question below.

PROGRAM A

```
char *foo()
{
 static char result[100]);
 strcpy(result,"WOLLA");
 return(result);
}


void main()
{
 char *j;
 j=foo()
 printf("%s",j);

}
```

PROGRAM B

```
char *foo()
{
static char result[100]);
strcpy(result,"WOLLA");
return(result);
}


void main()
{
char *j;
j=foo()
printf("%s",j);

}
```

PROGRAM C

```
char *foo()
{
char *result;

result = (char *) malloc(100*sizeof(char));
strcpy(result,"WOLLA");
return(result);
}
```

```
void main()
{
char *j;
j=foo()
printf("%s",j);

}
```

Answer: Define X = Always "WOLLA", Y = Arbitrary / may be "WOLLA". The answers for program A, program B and program C are respectively:\\

1. X, X, X.
2. X, X, Y
3. X, Y, X
4. X, Y, Y
5. Y, X, X
6. Y, X, Y
7. Y, Y, Y
8. Y, Y, X

Question 6. Study the program below and determine its output. In the space below write the output:

```
void main()
{
  char *s[]={ "dharma","hewlett-packard","siemens","ibm"};
  char **p;

  p=s;
  printf("%s",++*p);
  printf("%s",*p++);
  printf("%s",++*p);
}
```

Question 7. What is the correct output for the following program? Mark your choice.

```
main()
{int i=0;
for(i=0;i<20;i++)
{switch(i)
case 0:i+=5;
case 1:i+=2;
case 5:i+=5;
default i+=4;
break;}
printf("%d,",i);
}
}
```

a) 0,5,9,13,17
b) 5,9,13,17
c) 12,17,22
d) 16,21
e) Syntax error

Question 8. What is the ouptut of the following program

```
int main()
{  char c=-64;
  int i=-32;
  unsigned int u =-16;
   if(c>i)
   {printf("Pass1,");
    if(c<U)
      printf("Pass2");
    else
      printf("Fail2");
}
else
  printf("Fail1);
if(i<U)
  printf("Pass2");
else
  printf("Fail2")
}
```

a) Pass1,Pass2
b) Pass1,Fail2
c) Fail1,Pass2
d) Fail1,Fail2
e) None of these

Question 9. What will the following program do?

```
void main()
{
   int i;
   char a[]="String";
   char *p="New Sring";
   char *Temp;


   Temp=a;
   a=malloc(strlen(p) + 1);
   strcpy(a,p); //Line number:9//
   p = malloc(strlen(Temp) + 1);
   strcpy(p,Temp);
   printf("(%s, %s)",a,p);
   free(p);
   free(a);
} //Line number 15//
```

a) Swap contents of p & a and print:(New string, string)
b) Generate compilation error in line number 8
c) Generate compilation error in line number 5
d) Generate compilation error in line number 7
e) Generate compilation error in line number 1
f) Segmentation fault (most likely)

Question 10. In the following code segment what will be the result of the function, value of x , value of y

```
{
   unsigned int x=-1;
   int y;
   y = ~0;
   if(x == y)
     printf("same");
   else
     printf("not same");
}
```

a) same, MAXINT, -1
b) not same, MAXINT, -MAXINT
c) same , MAXUNIT, -1
d) same, MAXUNIT, MAXUNIT
e) not same, MAXINT, MAXUNIT

Question 11. What will be the result of the following program ?

```
char *gxxx()
{  static char xxx[1024];
   return xxx;
}
main()
{

   char *g="string";
   strcpy(gxxx(),g);
   g = gxxx();
   strcpy(g,"oldstring");
   printf("The string is : %s",gxxx());
}
```

a) The string is : string
b) The string is : oldstring
c) Run time error/Core dump
d) Syntax error during compilation
e) None of these

Question 12 What is the output for the following C program

```
main()
{
   char *p1="Name";
   char *p2;
   p2=(char *)malloc(20);
   while(*p2++=*p1++);
    printf("%s\n",p2);
}
```

Question 13 Find the output for the following C program

```
main()
{
   int x=20,y=35;
   x = y++ + x++;
   y = ++y + ++x;
   printf("%d %d\n",x,y);
}
```

Question 14 What is the output for the following C program

```
main()
{
  int x=5;
  printf("%d %d %d\n",x,x<<2,x>>2);
}
```

Question 15 What is the output for the following C program

```
#define swap1(a,b) a=a+b;b=a-b;a=a-b;
main()
{
   int x=5,y=10;
   swap1(x,y);
   printf("%d %d\n",x,y);
   swap2(x,y);
   printf("%d %d\n",x,y);
}
int swap2(int a,int b)
{
   int temp;
   temp=a;
   b=a;
   a=temp;
   return;
}
```

Question 16 What is the output for the following C program

```
main()
{
   char *ptr = "Ramco Systems";
   (*ptr)++;
   printf("%s\n",ptr);
   ptr++;
   printf("%s\n",ptr);
}
```

Question 17. Find the output for the following C program

```
#include <stdio.h>
main()
{
   char s1[]="Ramco";
   char s2[]="Systems";
   s1=s2;
   printf("%s",s1);
}
```

Question 18 What is the output for the following program?

```
void main()
{
int i;
for(i=1;i<4,i++)
switch(i)
case 1: printf("%d",i);break;
{
case 2:printf("%d",i);break;
case 3:printf("%d",i);break;
}
switch(i) case 4:printf("%d",i);
}
```

Question 19. What is the output for the following program?

```
void main()
{
char *s="\12345s\n";
printf("%d",sizeof(s));
}
```

Question 20 What is the output of the following program?

```
void main()
{
   unsigned i=1; /* unsigned char k= -1 => k=255; */
   signed j=-1; /* char k= -1 => k=65535 */
/* unsigned or signed int k= -1 =>k=65535 */
 if(i<J)
   printf("less");
else
 if(i>j) printf("greater");
else if(i==j)
  printf("equal");
}
```

Question 21 What's the expected output for the following program and why?

```
enum {false,true};

int main()
{
        int i=1;
        do
        {
                printf("%d\n",i);
                i++;
                if(i < 15)
                        continue;
        }while(false);
        return 0;
}
```

Question 22 The following is a simple C program to read and print an integer. But it is not working properly. What is(are) the mistake(s)?

```
#include <stdio.h>
int main()
{
    int n;
    printf("Enter a number:\n");
    scanf("%d\n",n);

    printf("You entered %d \n",n);
    return 0;
}
```

Question 23 Is the following a valid C program?

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

```
#define PrintInt(expr) printf("%s : %d\n",#expr,(expr))
int max(int x, int y)
{
    (x > y) ? return x : return y;
}

int main()
{
    int a = 10, b = 20;
    PrintInt(a);
    PrintInt(b);
    PrintInt(max(a,b));
}
```

Question 24 The following is a piece of C code, whose intention was to print a minus sign 20 times. But you can notice that, it doesn't work.

```
#include <stdio.h>
int main()
{
    int i;
    int n = 20;
    for( i = 0; i < n; i-- )
        printf("-");
    return 0;
}
```

Well fixing the above code is straight-forward. To make the problem interesting, you have to fix the above code, by changing exactly **one** character. There are three known solutions. See if you can get all those three.

Question 25 What's the mistake in the following code?

```
#include <stdio.h>
int main()
{
    int* ptr1,ptr2;
    ptr1 = malloc(sizeof(int));
    ptr2 = ptr1;
    *ptr2 = 10;
    return 0;
}
```

Question 26 What is the output of the following program?

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

```
int main()
{
    int cnt = 5, a;

    do {
        a /= cnt;
    } while (cnt--);

    printf ("%d\n", a);
    return 0;
}
```

Question 27 What is the output of the following program?

```
#include <stdio.h>
int main()
{
    int i = 6;
    if( ((++i < 7) && ( i++/6)) || (++i <= 9))
        ;
    printf("%d\n",i);
    return 0;
}
```

Question 28 What is the bug in the following program?

```
#include <stdlib.h>
#include <stdio.h>
#define SIZE 15
int main()
{
    int *a, i;

    a = malloc(SIZE*sizeof(int));

    for (i=0; i<SIZE; i++)
        *(a + i) = i * i;
    for (i=0; i<SIZE; i++)
        printf("%d\n", *a++);
    free(a);
    return 0;
}
```

Question 29 Consider the following program.

```
#include <stdio.h>
#define MAX 10
int main{}
{
  if (MAX = MAX+1)
  {
```

```
    for (i=0;i<=++i;i++)
    {
      printf("Max\n");
    }
  }
  else printf ("%d\n",MAX);
}
```

Which of the following statements is true about the above program (Choose one)?

(a) Program outputs 10 on execution
(b) Program outputs 11 on execution
(c) Program gives error on compilation
(d) Program will not execute or crash on being executed
(e) Program goes into an infinite loop on execution and hangs
(f) Prints nothing
(g) None of the above

Question 30 Consider the program.

```
#include <stdio.h>
int fib(int i)
{
  if (n%2 == 0)
    return fib(n-1)+fib(n-2);
  else if (n == 1)
    return 1;
  else return 0;
}
int main()
{
   printf("%d,%d",fib(5),fib(10));
   return 0;
}
```

Which one of the following statements is true about the above program:

(a) Program does not compile.
(b) Program does not execute.
(c) On execution, program says memory is insufficient and crashes.
(d) On execution, program goes into an infinite loop and hangs (i.e., you do not get a prompt on the terminal again).
(e) On execution, program outputs 5, 55.
(f) On execution, program outputs inf, inf.
(g) On execution, program outputs 8, 89.

[10 points]

Question 31. Consider the following program.

```
1. #include <stdio.h>
2. #include <stdlib.h>
3.
4. void func(int *b, int **c)
```

```
5. {
6. *c = (int *) malloc(5*sizeof(int));
7. b = (int *) malloc (2*sizeof(int));
8. *b = 21;
9. printf("%p\n", b++);
10. (*c)[0] = 50; (*c)[1]=60; (*c)[2]=70;
11. }
12.
13. int main()
14. {
15. int *a,c;
16. char d;
17. d = 300;
18. c = 500;
19.
20. printf("int_val_d=%d, char_val_d=%c\n",(int)d, d);
21. printf("int_val_c=%d, char_val_c=%c\n",c,(char) c);
22. func(a,&a);
23. printf("%d ", *a);
24.
25. return 0;
26. }
```

What happens when the above program is executed?