• This is a closed book, closed notes exam.

• Turn off all your electronic devices. No devices are allowed.

• You have 50 minutes time.

• This page is the answer page for the multiple choice questions. Mark your answers clearly by checking (X) the boxes on this page. Answers marked on other pages will not be considered.

• There are 20 multiple choice questions and 2 free form questions. Make sure you have all the pages with the questions.

• For each question, there are five choices of answers. Mark (X) the corresponding box on this answer sheet.

• In program code, lines are numbered. The line numbers are for reference only and thus are not part of the program code.

• No questions during the exam. When in doubt, write down a note and state all your assumptions clearly.

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1. In the Unix environment, mv can be used to?
   a) move your account from one server to another
   b) rename or move files
   c) change into a directory
   d) move from one user account to another
   e) merge content of 2 files

2. What is output of the following C statement?
   printf("%s","Good\n\tLuck");
   a) Good         Luck
   b) Good
   c) Good luck
   d) Good
   e) Good\n\tLuck

3. C is
   a) A language that cannot be used to write efficient programs
   b) A language that cannot be used for doing scientific computation
   c) A structured programming language
   d) A machine language
   e) A language specially developed to torment undergraduate students

4. The statement #include<stdio.h> is used in C programs
   a) because the C standard requires it to be there
   b) so that one can access the ANSI C standard I/O functions
   c) because Pico editor need this to show the C program being typed
   d) to access the pow() library function
   e) so that one can call user defined functions

5. Suppose you use scanf() conversion, "%Ns", to scan a string into a char array of size 6, which of the following values of N will ensure that the string is properly bounded
   a) 6  b) 5  c) 8  d) any integer value
   e) any integer value greater than 6

6. What will be the output when the following block of code is executed
   1    int a=5;
   2    int b;
   3    b = a -1;
   4    if(a = b )
   5          printf("a = b");
   6    else
   7          printf("a != b");
   a) 5 != 4 b) a = b c) a != b d) 5 = 4 e) none of the above

7. What will be the output of the code given in question 6 if line 4 is changed to if(a == b)
   a) 5 != 4 b) a = b c) a != b d) 5 = 4 e) none of these

8. Which of the following is the correct declaration for a function f which takes in two integers as input and returns a float
   a) int a int b f(float r);
   b) int f( int a , float r );
   c) float f(int a , int b , void)
   d) float f(int a , int b);
   e) such functions cannot be declared in C

9. What is the value of x , after the following statement
   x= (17>23)?10:11;
   a) 10 b) 11 c) 12 d) 21 e) -1

10. What is the output of the following block of code
    1    float f;
    2    int a;
    3    a = 10;
    4    f= a/3;
    5    printf("%f",f);
    a) 3.000000 b) 3 c) 3.333333 d) 3.4 e) 4
11. What will be the output of the code block given in question 10, if line 4 is changed to 
   \( f = \text{(float)}a/3; \)
   a) 3.000000 b) 3 c) 3.333333 d) 3.400000 e) 4

12. In the following block of code:
   1    int x=4;
   2    int y;
   3    y = x<<1 ;

   Line 3 can be replaced with which of the following to produce the same result?
   a) \( y = x*2; \) b) \( y = x/2; \) c) \( y = x*x; \) d) \( y = x*1; \) e) \( y = x-1; \)

13. What is the value of \( x \) after the following block of code gets executed?
   1    int x;
   2    int a=6,b=5;
   3    if((a==b+1)||(b==a+1))
   4       x = a;
   5    else
   6       x = b;

   a) 5 b) 6 c) 0 d) 1 e) 42

14. What would be the value of \( x \), if line 3 in the block of code above, is changed to
   if((a==b+1)&&(b==a+1))

   a) 5 b) 6 c) 0 d) 1 e) 42

15. What is the value of \( z \) after the while loop is executed?
   1    int z = 24;
   2    while(z > 8)
   3       z = z-1;
   4    }
   5    }

   a) 8 b) 9 c) 24 d) 7 e) 23

16. Which of the following are true about recursive functions?
   i. A recursive function calls itself
   ii. Factorial of a number can be calculated using a recursive function
   iii. Recursive functions are used so that only TAs/Instructors can understand programs having them
   iv. A recursive function never returns anything to its caller

   a) all of the above b) i, ii and iv c) iii d) i and ii e) iv

17. Look at the following block of code:
   1    int f(int x)
   2    {
   3       printf("%d ", x);
   4       return x + 1;
   5    }
   6    int g(int x)
   7    {
   8       printf("%d ", f(x));
   9       return x + 2;
  10    }
   11    void h(int x)
   12    {
   13       printf("%d ", f(x));
   14       printf("%d ", g(x));
  15    }

   What is returned by the function call \( f(1) \)?
   a) 3 b) 1 c) 2 d) 2 e) 1+2

18. For the block of code in question 17, what is returned by the function call \( g(1) \)?
   a) 1 b) 2 c) 3 d) 2 e) 3

19. The following statements
   1    y = x;
   2    x = x +1;

   Will produce the same result as
   a) \( y = x++; \) b) \( y = ++x; \) c) \( x = y++; \) d) \( x= --y; \) e) \( x = ++y; \)

20. What is the output of the following block of code:
   1 char abcde[] = "abcde"
   2 printf("%c",abcde[1]);

   a) a b) b c) c d) d e) e
Programming/Program Analysis questions:

21. Implement a function my_pow(), which takes in two integers (say a and b) and returns a long int \(a^b\) (a raised to the power of b). The function declaration should look like

```c
long int my_pow(int a, int b);
```

Answer this question on the reverse of this page

-------------------------------------------------------------------------------------------------------------------------------

22. Look at the following function

```c
double max(double x[], int n)
{
    int k;
    double max_x;
    max_x = x[0];
    for(k =1;k<=n-1;k++)
        if(x[k] > max_x)
            max_x = x[k];
    return max_x;
}
```

i. What does this function max( ) do?

Assume that we have define the variables

```c
int k=6;
double data[]={1.5,3.2,-6.1,9.8,8.7,5.2};
```

What is the value of each of the following expressions

ii. max(data,6)

iii. max(data,5)

iv. max(data,k-3)

v. max(data,k%5)