Course Number   : **TA UC162**

Course Name   : **Computer Programming - I**

Nature of Component   : **Comprehensive Examination**

Weightage   : **40%**

Max. Marks   : **40 Marks**

Duration   : **3 hours**

Date of Examination   : **21.05.2007**

Number of Pages	: 4
Sections (A& B)	: 2
Number of Questions: 21	

Note: 1) Use Separate Answer Book for each section A & B.
  2) All the questions are to be answered sequentially.

SECTION – A

1. **State whether each of the following is true or false**   (2½ Marks)
   a) **void** function should have only **void** as its argument.
   b) A function without **return** statement is illegal.
   c) An expression that evaluates to an integral value may be used as a subscript.
   d) The declaration **int** x[2] = {4,5,6} ; is illegal.
   e) The use of continue statement is considered as unstructured programming.

2. **Fill in the following blanks**   (2½ Marks)
   a) To print the data left justified , we must use _____ in the field specification.
   b) In an exit-controlled loop, if the body is executed **n** times , the test condition is
      evaluated _____ times.
   c) Multiway selection can be accomplished using an **else if** statement or the _____
      statement.
   d) By default, _____is the return type of a C function.
   e) In prototype declaration , specifying _____ is optional..

3. Write a program in c to find
         a) the number of integers and
         b) sum of all integers   greater than
            50 and less than 100 that are divisible by 7.

                                                              (4 Marks)

4. Write a program in C to input and determine the biggest and smallest elements
   of the following matrix using a single nested for loop.

$$\begin{bmatrix} 9 & 4 & -7 & 6 \\ 8 & 2 & 3 & 4 \\ 10 & 7 & 5 & 6 \\ 1 & 8 & 9 & -2 \end{bmatrix}$$

                                                              (3 Marks)

5. Write only the function in C to verify whether **x** is divisible by **y** .
The function should return **1** if **x** divides **y** else it should return **0**. (2 marks)

6. How many times the following program segments (loops) will be executed.

a)
```
- - - - -
- - - - -
x=5;
y=50;
while (x <= y)
{   - - - - - -
    x=y / x;
    - - - - -
    - - - - -
}
```

b)
```
- - - - -
- - - - -
m=10;
n= 7;
do
{
    - - - - -
    - - - - -
    m = m+1;
    n = n+2 ;
}
while (m % n > 0);
```
(2 marks)

7. Describe the output generarted by the following programs.

a)
```
#include <stdio.h>
main()
{ int a , sum=0;
  int c[7] ={2, 5 ,10,15,20,30,35};
  for (a = 0;  a < 7;  a++)
   if (a % 3 == 0)
     sum +=c[a];
   printf( "%d" , sum);
}
```

b)
```
#include <stdio.h>
main()
{ int i, mul = 1;
  int x[6] = {10,15,20,30,40,5};
  for (i = 0; i < 6; i++)
   if ( x[i] % 10 != 0 )
     mul *=x[i];
   printf("%d",mul);
}
```
(2 marks)

8. a) Define a one dimensional character array called **point** . Assign the string **NORTH** to the array elements. End the string with the null character.
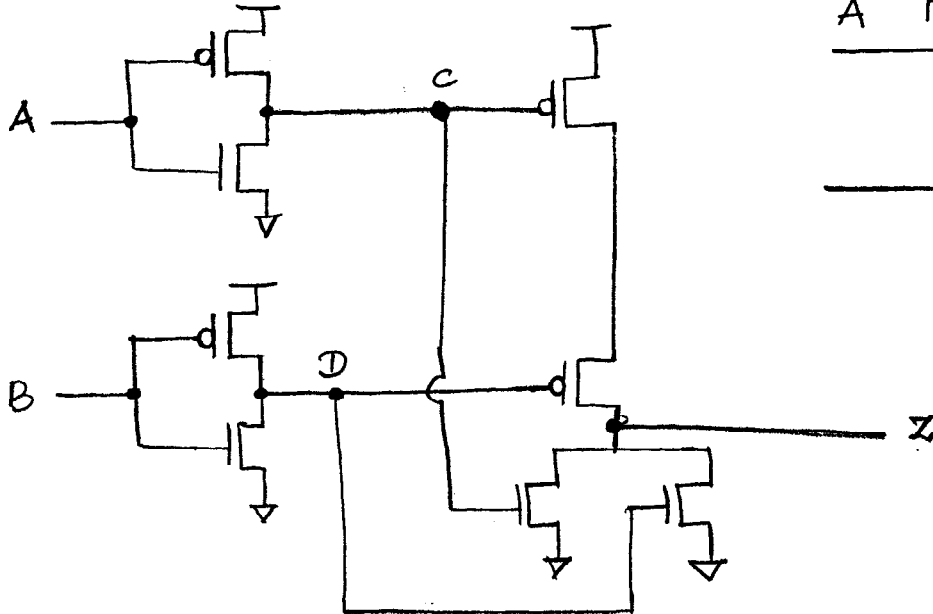
b) Define a one dimensional floating point array called **consts** . Assign the following values to the array elements.

0.005 , -0.032 , 1e-6 , 0.167 , -0.368 , 0.015 . (2 marks)

SECTION – B

9. For the transistor-level circuit shown below, fill the truth table. What is Z in terms of A and B?

Truth Table :-

A	B	C	D	Z

(2 marks)

10. What are the actions of the following UNIX commands ?

a) ls -l   b) cp ~/ file.   c) rmdir junkdir d)pwd   (2 marks)

11. Draw a transistor-level diagram for a three input AND gate and a three-input OR gate.
(2 marks)

12. How many output lines will a 16 input multiplexer have? How many select lines will this multiplexer have?
(1 mark)

13. Assume that there are about 400 students in 1st year B.E.. If every student is to be assigned a unique bit pattern, what is the minimum number of bits required to do this? How many more students can be admitted to the I year without requiring additional bits for each student's unique bit pattern?   (1 mark)

14. Convert the following decimal numbers to 8-bit 2's complement binary numbers; and justify your answer.

a) 127
b) -128   (2 marks)

15. In a typical digital computer, the word length of the processor is 16 bits, how many distinct memory locations let this digital computer will have?   (1 mark)

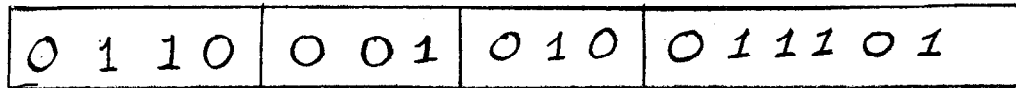16. To keep track of which instruction is being executed , the control unit has an _____ to hold it.   (1 mark)

17. What do you mean by instruction pointer? What is the other name for instruction pointer?

(1 mark)

18. What does the 16 bit LC3 instruction represents? Give the data path relevant to the execution of the given instruction.

0 1 1 0	0 0 1	0 1 0	0 1 1 1 0 1

(2 marks)

19. Given instructions ADD, JMP, LEA, and NOT, identify whether the instructions are operate instructions, data movement instructions, or control instructions. For each instruction, list the addressing modes that can be used with the instruction.   (2marks)

20. Perform the following operation using only three LC-3 instructions: R1 ← R2 – R3

(1 mark)

21 .What does the following program do?

```
                      . ORIG  X3000
                      LD    R2, ZERO
                      LD    R0, M0
                      LD    R1, M1
        LOOP          BRz   DONE
                      ADD   R2, R2, R0
                      ADD   R1, R1, # -1
                      BR    LOOP
        DONE          ST    R2, RESULT
                      HALT

        RESULT        . FILL  X0000
        ZERO          . FILL  X0000
        M0            . FILL  X0004
        M1            . FILL  X0003
                      . END
```

(2 marks)

--oOo--

Note: Answer the questions sequentially.
        Read the instructions given on the front page of the Answer sheet.
        Only Text books and Class notes are allowed.

Section A

1. Write an appropriate **function call**(function access) for each of the following:-

   (0.5 * 2 = 1 mark)

   a)
   ```
   float formula(float x)
   {
     float y;
     y=3 * x – 1;
     return(y);
   }
   ```

   b)
   ```
   void display(int a, int b)
   {
     int c;
     c = sqrt(a*a + b*b);
     printf("c=%d",c);
   }
   ```

2. Write the function header, including the formal arguments declarations, for each of the following:-

   (0.5 * 2 = 1 mark)

   a)
        a function called **root** accepts two **integer** arguments and returns a **floating point** result.

   b)
        a function **convert** accepts a **character** and returns no value.

3. Write appropriate array definition statement for each of the following:-
   a)
        define a one-dimensional, 5-element integer array called **c**. Assign the values 1,4,7,10,13 to the array elements.   (0.5 mark)

1

b)
      define a one-dimensional, four-element character array called **letters.** Assign the characters 'N', 'S', 'E' and 'W' to the array elements.   (0.5 mark)

c)
      define a two-dimensional, 3 x 4 integer array called **n.** Assign the following values to the array elements: (1 mark)

10	12	14	16
20	22	24	26
30	32	34	36

4. A sequence starts with a=0, b=1, c=1. Every other term of the sequence is a sum of its three immediate predecessors. Write a C program to generate n terms of such a series. (1.5 marks)

5. Find the output of the following program segment:-   (0.5 mark)

```
#include<stdio.h>
main()
{
int a;
char p[]="Programming";
for(a=0; p[a] != '\0'; ++a)
   if ((a %2) == 0)
      printf("%c",p[a]);
}
```

Section B

6. Given two arrays **x** and **y** of size 20 each, develop a program in C to find the constants **a** and **b** using the relation   (2 marks)

$$a = \frac{\sum x_i + \sum x_i^2}{\sum y_i}$$

$$b = \frac{\sum x_i y_i + \sum y_i}{\sum x_i}$$

7. Write a function header namely *compute* of type **double** involving a parameter **x** of type **float, y** of type **double** and **z** of type **int.**   (1 mark)

8. Write the output of the following program:- (2 marks)

```c
#define ROWS 3
#define COLUMNS 4
#include<stdio.h>
main()
{
  int a,b;
  int z[ROWS][COLUMNS] = {1,2,3,4,5,6,7,8,9,10,11,12};
  for (a=0; a<ROWS; ++a)
  {
    for(b=0; b<COLUMNS; ++b)
      if ((z[a][b] %2) == 1) z[a][b]--;
  }
  for (a=0; a<ROWS; ++a)
  {
    for(b=0; b<COLUMNS; ++b)
      printf("%d    ", z[a][b]);
    printf("\n");
  }
}
```

9. Describe the array **a** that is declared in the following statement: (1 mark)

```c
#define R 10
#define C 5
char a[R][C];
```
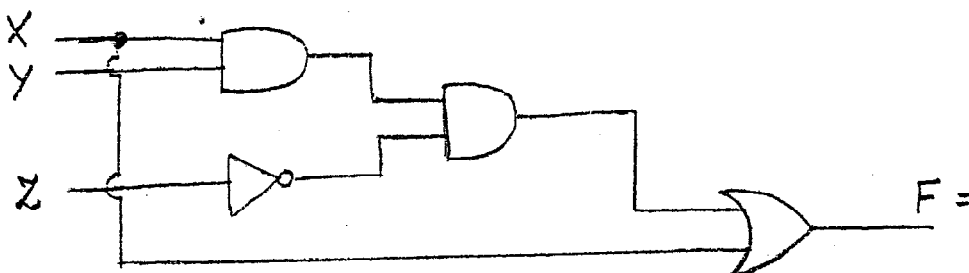
Section – C

10. Using logic gates construct a combinational logic circuit that satisfies the below given Truth table. (1 Mark)

| A	B	C
0	0	1
0	1	0
1	0	0
1	1	0

11. Give the Truth Table for the 3 inputs decoder combinational gate level logic circuit. (1 Mark)

12. Analysis the symbolic logic circuit shown below and obtain the logical expression for the given circuit. (1 Mark)

3

13. Redraw the following circuit using NAND logic gates. Substitute only equivalent signal lines and give the output expression that also satisfies the given original circuit.

(2 Marks)
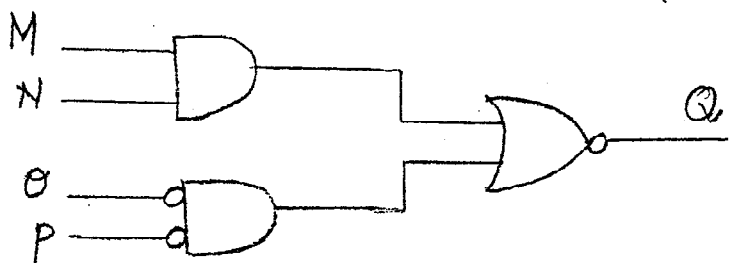
14. Consider the CMOS logic circuits given below; do the two logic circuits implement the same logic function? If **yes**, show the truth tables of both the circuit and prove that they are equal. If **no**, prove it why they are not equal.
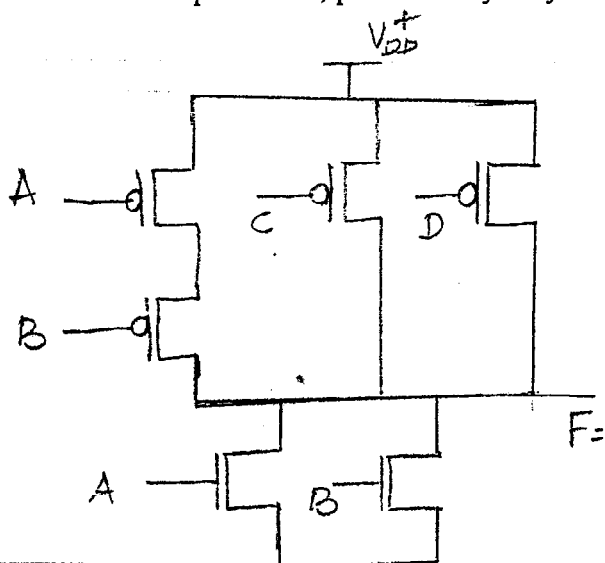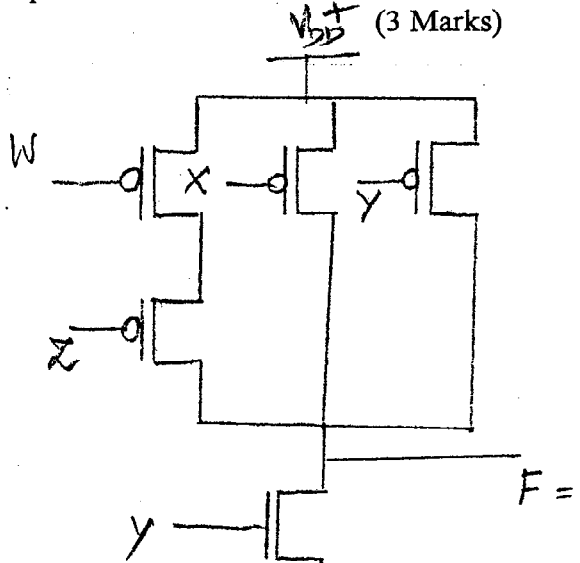
(3 Marks)

fig. 1.

fig. 2.

-----oOo-----

4

B

Course Number & Title	:	**TA UC162 – Computer Programming – I**
Component Name	:	**QUIZ – I (Closed Book)**
Weightage	:	10 %
Duration	:	30 minutes	**No. of pages : 3**
Date & Day	:	20-03-2007, Tuesday	**No. of Qns. :14**

Name of the Student : _____

Id. Number :   **Sec.** _____

Note:-1. Answer all questions. 2. No marks will be given for partial answers.

1. Identify the output of the following for loop.   (1 mark)

   for(i=1, j=10; i < j; i++, j--)
       printf("%d\t %d\n", i, j);
   <u>Ans:</u>

2. Give the exact application of the following for loop.   (0.5 mark)
       for(j=100; j>0; j = j-1)
           ;
   <u>Ans:</u>

3. Write a for statement to print the following: (1 mark)
       1 3 9 27 81 243
   <u>Ans:</u>

4. Write a single C program statement to do each of the following:
   i) declare a string.   (0.5 mark)
   <u>Ans:</u>

   ii) read its value with **no vowels.**   (0.5 mark)
   <u>Ans:</u>

5. For using character manipulation library function, we must include the header file _____ in the program. (0.5 mark)

6. How many times the body of the following do - while loop will be executed?

```
m=1;
do
{
    m= m+2;
}
while (m<10);
```
(0.5 mark)

Ans: ------- times.

7. What would be the output of the following statement?
```
for (m=10; m>7; m - =2)
    printf("%d \n",m);
```
(0.5 mark)

Ans:

8. In a while loop (top tested loop) structure , if the body of the loop is executed n times, then the test condition is evaluated ---------------- times. (0.5 mark)

9. Which of the following declarations is correct?

i) Float x[4][6] ; ii) float x[4,6] iii) float x[4][6] ; iv) float x(4)(6);

Ans. (0.5 mark)

10. If x='A' , Write a single **printf** statement to get the following output.

A
  A
    A
(0.5 mark)

Ans:

11. What would be the output of the following printf statement?

```
float  value = 235.7486;
int    count = 1275;
printf(" %5d \n %10.2f ", count,value);
```
(0.5 mark)

Ans:

12. Find the error in each of the following program segments and correct the error:

(each question carries 0.25 mark: 2 x ¼ = 0.5 mark)

    a) **for (y=0 .1; y=< 1.0; y += 0 .1)**
        printf("%f\n", y);
      <u>Ans:</u>

    b) The following code should print the values from 1 to 10.

      n = 1;
      while (n < 10)
        printf("%d", n++);
      <u>Ans:</u>

13. Write a statement for each of the following:

(each question carries 0.5 mark: 0.5 x 2 = 1 mark)

    a) Print **1234** right-justified in a **10** digit field.
      <u>Ans:</u>

    b) Declare **table** to be an integer array and to have **3** rows and **3** columns. Assume the symbolic constant **SIZE** has been defined to be **3**.
      <u>Ans:</u>

14. Fill in the blanks: *(each question carries 0.5 mark: 0.5 x 3 = 1.5 marks)*

    a) A _____ can be used in a scanf conversion specification to indicate that a specific number of characters or digits should be read from the input stream.

    b) A _____ should be used to declare the size of an array because it makes the program more scalable.

    c) The _____ statement, when executed in a repetition structure causes the next iteration of the loop to be performed immediately.

BITS, Pilani – Dubai Campus
Knowledge Village, Dubai
Second Semester 2006 –2007

No. of Questions: 15
No. of Sections : A, B, C

Course Number & Title	:	TA UC162 – Computer Programming – I
Component Name	:	Test – I (Closed Book)
Weightage	:	20 %
Duration	:	50 minutes
Date & Day	:	25-02-2007, Sunday

Note:-1. Answer all questions.
     2. Answer all the questions strictly in sequential order only.
     3. Recheck request will not be entertained if answers are not written sequentially.

Section – A

1. The expression x = 4 + 2 % -8 evaluates to _____.   (0.5 mark)

2. The expression a = 7 / 22 * (3.14 + 2) * 3/5 evaluates to _____.   (0.5 mark)

3. Given the following program segment :

    ```
    int big, a, b, c;
    big = (a>b ? (a>c ? 3:4) : (b>c ?6 :8));
    printf("%d", big);
    ```

    What will be the output if
    i)   a = 5, b = 3, c = 2
    ii)   a = 2, b = 3, c = 5   (0.5 + 0.5)

4. Identify the output of the following program
    ```
    #include<stdio.h>
    main()
    {
      int i=-3, j = 3;
      if (!i + !j * 1)
         printf("AAAA");
      else
         printf("BBBB");
    }
    ```
         (1 mark)

5 . For the following program segment, when the output **You entered 5** only
will be displayed ?
```c
main()
{
  int i;
  printf("Enter value of i");
  scanf("%d",&i);
  if (i==5)
  printf ( "Welcome");
  printf("You entered 5");
}
```
(0.5 mark)

6. Given the following declarations
int i = 8, j=5;
float x = 0.005, y = -0.01, z;
What is the value when each of the following statement is executed?
i)   k = (j = = 5) ? i : j;
ii)   z = (y >= 0) ? y : 0;
iii)   i - = (j > 0) ? j : 0
(0.5 + 0.5 + 0.5)

}

7.Point out the errors, if any, in the following C program segment with suitable
explanation
```c
main()
{
  float a = 3.5;
  switch (a)
  {
  case 0.5 :
        printf("\nThe art of C!");
        break;
  case 1.5 :
        printf("\n The spirit of C");
        break;
  case 2.5 :
        printf("\n See through C");
        break;
  default :
        printf("\n Simply C");
  }
}
```
(1 mark)

11. What would be the output of the following program segment ?

a. ------------

```
------------
m =  95;
x  =  100;
y  = 50;
if ( !(y) || (m > 90))
x = x- 10;
y = y + 20;                                    ( 1 mark)
printf( " x = %d  and y = %d " , x , y );
------------
```

```
--------
```

b. What is the value of z in the following program segment ?

```
int  x = 20, y = 10 , z ;
char  a ;
a = ' B';                                       (1 mark)
z = a + x * y;
```

Section – C

12. List the outcome of the following conditional tests in terms of the result 'true' or 'false'.

```
int  a=5, b=10;
```

a) if(!(a==5))
b) if(((b>=10) && (a<5)) || (b >= 2*a))
c) if((a-4) >= (b-a))   (1.5 marks)

13. What are the numerical and logical (true / false) values of the following expression given that 'a' has been initialized with the value 0, 'b' with the value 10, and 'c' with the value -6.

i.) !!a   ii.) a>b && c<5   iii.) !(!(a>b) || !(a != b))

(1.5 marks)

14. Derive equivalent if. . .else statements for the following tests:

w = (x > y) ? (a<b) ? (c>d) ? (m<n) ? (!z) ? a: b : c : d : e;   (2 marks)

15. In a parallel electrical circuit the combined resistance (r_{tot}) is calculated by the formula: $1/r_{tot} = 1/r_1 + 1/r_2$, where r_1 and r_2 are parallel resisters. The C program has to check whether the input r1 and r2 are non-zero value , if it is zero then the program has to generate an user defined error message. Finally, calculate and display the total combined resistance value using the formula mentioned above.

(2 marks)

8. Rewrite the following using conditional operators

```
main()
{
  int code;
  scanf("%d",&code);
  if (code>1)
      printf("\n Jerusalem");
  else
      if (code<1)
        printf("Eddie");
      else
        printf("C brain");
}
```
(1 mark)

Section – B

9. Find the errors, if any in each of the following segments and rewrite the correct statements.

```
a. if (x + y =  z  && y > 0)
      printf( "   " );
```

```
b. if (code > 1) ;
      a=b + c;
   else
      a = 0;
```
(2 marks)

```
c. #define  MAX  100;

   main()
   {
      Int  x, y ;
      float a, b;
      ----------
      ----------
   }
```

10. Write a program in C to find the biggest of three given integer numbers using nested if .... else statement   (2 marks)