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COLLEGE OF ENGINEERING, PUNE

(An Autonomous Institute of Govt. of Maharashtra)

End Semester Examination Nov, 2014

CT101 - Fundamentals of Computer Programming (FCP)

Class: - F.Y B.Tech.

Year: - 2014-15 **Semester: - I**

Duration: - 3 Hrs. 29 NOV 2014 10 to 1.00 p.m **Max. Marks: - 60**

Instructions:

1. All the Questions are compulsory. 2. Make suitable assumptions where required. 3. Assume all declarations and main function. 4. Read the question carefully before answering. 5. Ensure total 8 pages in question paper.

Question No. 1

A) What is the output of this C code ? justify your answer. **[2m]**

```
#include <stdio.h>
    void main(void)
    {
        int i = 0;
        while (i < 10)
        {
            i++;
            printf("hi\n");
        } while (i < 8)
            i++;
        printf("hello\n");
    }
```

B) What is the output of this C code ? justify your answer. **[2m]**

```
#include <stdio.h>
    void  main(void)
    {
        int i = 0;
        while (i = 0)
            printf("True\n");
        printf("False\n");
    }
```

C) What is the output of this C code ? justify your answer. **[2m]**

```
#include <stdio.h>
    void main(void)
    {
        int i = 0, j = 0;
        while (i < 5&& j < 10)
        {
            i++;
            j++;
        }
        printf("%d, %d\n", i, j);
    }
```

D) Explain the following types of loop with respect to following points in detail along with suitable example. 1.syntax 2. Application (Any 2) **[2m]**

a) for loop
b) while loop
c) do-while loop

OR

D) What is the output of this C code ? justify your answer. **[2m]**

```
#include<stdio.h>
    int main(void)
    {
        for( ; ; )
        {
            printf("%d ",10);
        }
        return 0;
    }
```

E) What is the output of this C code ? justify your answer. **[2m]**

```
#include<stdio.h>
    int main(void)
    {
        int x=9,i;
        for(i=0;i<x;i+=3)
        {
            printf("Start ");
            continue;
            printf("End");
        }
        return 0;
}
```

F) Write a C program to find the factorial of a number, where the number is entered by user. (**Hint:** factorial of n = 1*2*3*...*n) **[2m]**

Question No 2.

A) Selection_sort(K,N). Given a array K of integers of size N elements. Function rearranges element in ascending order. The variable PASS denotes the pass index and the position of the first element in an array which is to be examined during the particular pass. The variable MIN_INDEX denotes the position of smallest element encountered thus far in a particular pass. TEMP is the temporary local variable. The variable I is used to index elements K[PASS] to K[N] in a given pass. All variables are of integer type. Ignore syntax errors . Assuming array index starts from 1(One) instead of zero (0) and all other necessary declarations are suitably made , complete the following algorithm for selection sort.

[4m]

```
Step 1: [Loop on pass Index]
        Repeat thru step 4 for PASS = 1  to  N-1
Step 2: [Initialize minimum index]
```

```
    MIN_INDEX =_____________
Step 3: [Make a pass and obtain element with smallest value]
     Repeat for    I = PASS+1   to   _____________
    IF  K[I]  < K[MIN_INDEX]
   then  ____________________________
Step  4:  [Exchange  elements of array]
       IF   _____________   !=   _____________
    then   {
             TEMP = K[PASS]
             K[PASS] = K[MIN_INDEX]
            K[MIN_INDEX] = TEMP
           }
Step 5: [ Algorithm Ends]
        EXIT
```

B) Based on the above logic of selection sort ,Show the contents of array at the end of each pass(outer loop) on the following elements of an array. Encircle or underline the elements swapped during the particular pass. **[6m]**

Array Element							
98							
88							
78							
68							
58							
48							

C) What is the output of the following code ? Ignore syntax error if any. **[2m]**

```
#include<stdio.h>
void main(void)
{ int i,j;
int table [2][3] = { {1,1},{2}};
for (i=0;i<2;i++)
for (j=0;j<3;j++)
printf("%d  \t " ,table[i][j]);
}
```

OR

C) BINARY_SEARCH(K,N,X) : Given an array K of integers of size N elements in ascending order . This algorithm searches the array for a given element whose element is given by X. The variable LOW , MIDDLE and HIGH denotes the lower ,middle and upper limits of the search interval respectively. The function returns the index of the array element if the search is successful and returns 0 otherwise. Assuming array index starts from 1 instead of 0 and all other suitable declarations have been made. All variable are of integer type. Ignore the syntax errors. Complete the following pseudo code. **[2m]**

```
Step 1: [Initialize ]
```

```
        LOW = 1
       HIGH = N
Step 2 :  [Perform Search ]
  Repeat  thru  step 4   while LOW  <=  HIGH
Step 3: [ Obtain the  midpoint of interval ]
   MIDDLE = floor (  ( ( LOW+HIGH)/2)  )
Step 4 : [Compare]
         If  X  <  K[MIDDLE]
         then   HIGH =_____________________
         else
           If   X > K[MIDDLE]
           then  LOW = _____________________________-
           else   {  printf("SUCCESSFUL SEARCH ")
                return (MIDDLE)    }
Step 5 : [Unsuccessful search ]
    printf("UNSUCCESSFUL SEARCH ")
          return (0)
```

Question No. 3

A) Define a structure called point which has 2 members x and y of type integer. Define a structure called line which has two members A and B of type point. Write a function called 'length' that takes as parameters the endpoints of the line. These are of type pointer to structure line and returns a float which is the length of the line. **[4m]**

B) Complete the following program based on the instructions given as comments in the program: **[4m]**

```
#include<stdio.h>
        typedef struct DATE{
                int dd, mm, yy;
                }date;

        typedef struct telephone {
                char *name;
                int number;
                date install_date;
        }TELEPHONE;

        void main() {
                TELEPHONE index;
                TELEPHONE *ptr_myindex;
                ptr_myindex = &index;
                ptr_myindex->name = "Someone";
                ptr_myindex->number = 12345;
                //take input from user the install_date using pointer notation
                scanf(----------------------------);
                //print name
                printf("Name: %s\n", ----------);
                //Print number
```

```
            printf("Telephone number: %d\n",---------- );
            //Print install date using dot notation only.
            printf("install date is----------");
        }
```

C) Find the output of the following program. **[4m]**

```
#include<stdio.h>
void main(void){
typedef struct test{
char *z;
int i;
struct test *p;
}TEST;

static TEST a[]={{"C program",1,a+1},{"JAVA program",2,a+3},{"PHP
program",3,a+1},{"ASP Program",4,a+2}};

TEST *ptr=a;

printf("%s\n",ptr->z);
printf("%s\n",a[(ptr+1)->i].z);
printf("%s\n",a[ptr->p->i].z);
printf("%s\n",a[ptr+2->i].z);
}
```

Question No. 4

A. Solve any three of the given problems. [6 m]

1. Examine the code given below. For every variable used in that code, write the scope and lifetime. (Use line numbers for reference.)
   Sample Answer – Scope of X is global and lifetime is the entire execution time of the program. **You can also write answer in the form of a table. [2 m]**

```
1   float X=3.72;
2   float Y=1.48;
3
4   float  f1(int x, int y) {
5    if(x>=0)
6        x +=  x*X + y*Y;
7    else {
8        float Z =  -9.14;
9        x += x*X – y*Y + Z;
10      }
11   return   x;
12  }
13  int main() {
14    int i,j=3;
15    float A[5];
16    for(i=0;i<5;i++) {
17          int j=2;
```

```
18          A[i] =  f1(i,j);
19         }
20   return 0;
21  }
```

2. What are the logical or programmatic mistakes in the code given below ? Ignore syntax errors, if any. Assume main and other declarations. **[2m]**

```
1   int *give(int S) {
2     int Z[S];
3     int j;
4     for(j=0;j<S;j++)
5           Z[j] = 0;
6     return Z;
7   }
8   void  main(void){
9    int *A, i;
10  A = give(12);
11   for(i=0;i<12;i++) {
12       A[i] = 8*i+6;
13      }
14  }
```

3. What are the logical or programmatic mistakes in the code given below ? Ignore syntax errors, if any. Assume main and other declarations. **[2m]**

```
1   /* Code for carrying out Matrix Multiplication of two double precision floating point
2   matrices. */
3   void  MatMult(double A[], double B[], double C[], int m, int n){
4    int i,j,k;
5    for(i=0; i<m; i++)
6       for(j=0; i<n; j++)
7          for(k=0; k<m; k++) {
8              C[i][j] = A[i][j] * B[i][j];
9          }
10   return;
11  }
12
```

OR

3. Explain what is meant by the following terms **[2 m]**

1. Initialising a pointer.
2. Dereferencing a pointer.

B. Examine the code given below and answer the questions. **[6 m]**

```
1   #include<stdio.h>
2   #include<stdlib.h>
3
4   float* M(float *A, int n)
5   {
6    float t;
```

```
7    int i,j,k;
8    float *M1, *M2, *S;
9    S = malloc(sizeof(float)*n);
10
11   if(n==2)
12           {
13            if(A[0]>=A[1])
14                   {
15                    *S = *(A+1);
16                    *(S+1) = *A;
17                   }
18           else
19                   {
20                    *S= *A;
21                    *(S+1) = *(A+1);
22                   }
23           }
24   else
25           {
26            M1 = M(A, (n/2));
27            M2 = M(A+n/2, (n/2));
28            for(i=0,j=0,k=0; i<n/2 && j<n/2;)
29                   {
30                    if(M1[i]<M2[j])
31                           *(S+k++) = *(M1+i++);
32                    else
33                           *(S+k++) = *(M2+j++);
34                   }
35            if(i<j)
36                   for(;i+j<n;)
37                           *(S+k++) = *(M1+i++);
38            else
39                   for(;i+j<n;)
40                           *(S+k++) = *(M2+j++);
41           }
42    return S;
43   }
44
45    void  main(void) {
46   float T[ ] = { 3.141592,1.618033, 2.718281, 1.732050, 2.645751, 0.123456, 0.011010,
47   1.414213 };
48    float *X;
49    int i;
50    for(i=0;i<8;i++)
51           printf("%f\t",T[i]);
52    printf("\n");
53    X = M(T,8);
54    for(i=0;i<8;i++) {
55           printf("%f\t",X[i]);
56    printf("\n");
57   }
```

1. Write the output of this code. **[2 m]**
2. How many times is the function `M' called in this case ? **[2 m]**
3. If the input array had `N' floating point numbers (assuming N is a power of 2) arranged

in random order, then how many times would function M be called ? **[1 m]**

4. What exactly is the code from Line-28 to Line-40 doing ? **[1 m]**

Question No. 5

A) State wheather the following statements are TRUE or False **[2m]**

1. A file must be opened before it can be used
2. function fseek() may be used to seek from the beginning of the file
3. A file must be opened in w+ mode for both purpose for read and write
4. All files must be explicitly closed before terminating a program

B) When do we use the following functions : free(), rewind() ? **[2m]**

C) Answer the following **[5 m]**

1. What is the output of the following program ? Justify your answer.

```
#include<stdio.h>
int main(void)
{
    char c;
   FILE *fp;
   fp=fopen("test.txt","r");
   while(( c=fgetc(fp)) != EOF)
       printf("%c",c);
   fclose(fp);
   return 0;
}
// Text file -- test.txt
I am reading file handling in c
```

2. What is the output of the following program? Justify.

```
#include<stdio.h>
void main(void){
   char arr[7]="Network";
   printf("%s",arr);
}
```

3. What is the output of the following program ?

```
void main(void){
  printf("%s","c" "question" "bank");
}
```

D) Write a program to copy the contents of one file into another **[3m]**

OR

Write a program to append one file at the end of other.