

1. a The following C statement results in a warning? Briefly describe the reason(s) for the warning and rewrite it correctly to remove the warning. [2]

```
char x_string[8]="This is a C Program";
```

- b What is the output of the following C program? [3]

```
#include<stdio.h>
int func(int);
int main()
{
int m=4;
printf("First call: %d\n", func(m));
printf("Second call: %d\n", func(++m));
return 0;
}
```

```
int func(int n)
{
int i=5;
i += n;
n +=3;
return i;
}
```

- c Consider the following code segment:

```
char a,b;
int c;
scanf("%c%c%d",&a,&b,&c);
if (a=='a')
{
if(b=='a')
printf("%c\n",b+3);
else
printf("%c\n",a+3);
}
else
printf("%c\n",c+a);
```

Write down the output if the input entered (from the keyboard) is as follows:

[4]

- (i) ba4
- (ii) aa4

d Rewrite the following if-else construct using a switch statement: [2]

```
char c;
int n, m;
if ( c == 't' )
n++;
else
m += 2;
```

e Find the output of the following segment of a C program. [3]

```
int x[]={2,-1,0,7,5};
printf("%d\n",*x-1);
printf("%d\n",*(x+2));
printf("%d\n",*x+6-3[x]);
```

2. Create a binary search tree with the nodes 7, 10, 14, 5, 9, 11, 4, 13, 6. Write down the output of the preorder and postorder traversal. [7]

3. Define a structure that describes a point in a two-dimensional Cartesian plane. Write a C function which takes addresses of two points as its arguments and returns the midpoint of the line segment joining these two points. [7]

4. Write a C function that accepts an integer array and an integer (that denotes the actual size of the array) as its arguments and reverses the elements of the integer array. For example, if the original array was {3,1,4,2,0,5}, then it would become {5,0,2,4,1,3} upon completion of the function. You must not use any other array inside the function. [6]

5. The sequence  $F_n$  of Fibonacci numbers is defined by the recurrence relation

$$F_n = F_{n-1} + F_{n-2}, \quad n \geq 2, \quad F_0 = 0, \quad F_1 = 1.$$

Write a recursive C function that accepts a non-negative integer  $n$  as its argument and returns the Fibonacci number  $F_n$ . What would be the total number of calls made to this recursive function for  $n = 5$ ? Justify your answer. [8]

6. Copy the following code with modifications at appropriate places (see the comment parts of the program). The program finds the total number of consonants (nconst) and total number of vowels (nvowels) in the string st. [8]

```
#include<stdio.h>
int main()
{
char st[]="MTH409: Computer Programming";
int nconst=0,nvowel=0;
/*Write code that finds the total number of consonants and total number of vowels*/
/*Print the total number of consonants and total number of vowels*/
return 0;
}
```