

1. Rewrite the following code without using **while**, **if** and **if-else** constructs. Also, write down the output of the code? [8]

```
int i,j;
i=-1,j=2;
while(i+j<8)
{
    if(i+j%2 != 0)
        i++;
    else if(j%2 != 0)
        j++;
    else
        i++;
    j+=2;
}
printf("i=%d  j=%d\n",i,j);
```

2. A method for calculating binomial coefficient $\binom{n}{k}$ is the recursive formula

$$\binom{n}{k} = \binom{n-1}{k-1} + \binom{n-1}{k} \quad \text{for all integers } n, k \text{ such that } 1 \leq k \leq n-1$$

with

$$\binom{n}{0} = \binom{n}{n} = 1 \quad \text{for all integers } n \geq 0.$$

Consider the recursive *C* function **binom** in which arguments **n** and **k** satisfy the conditions given above and it returns the value of $\binom{n}{k}$. Copy the given code and fill in the details.

```
int binom(int n, int k)
{

}

}
```

Also, determine how many times the recursive function **binom** will be called with **n=4** and **k=2**. Justify your answer. [8]

3. Write a C program that does the following:

It reads a positive integer from the keyboard. The program terminates with an appropriate message in case of invalid input. Otherwise, it prints out the difference between the input number and the reverse of the input number. For example, if the input number is 123, then the output will be 198. (input=123, reverse of the input=321, difference=321-123=198) [8]

4. Rewrite the following code without using **for** and **switch** constructs. Also, write down the output of the code? [8]

```
int m,n;
for(m=1,n=2;m+n<11; n++)
{
switch(m%n != 0)
{
case 0: m*=2;
        break;
default: m +=2;
}
}
printf("m=%d n=%d\n",m,n);
```

5. Write a C function that takes a positive integer **n** as an argument and returns **1** if **n** is prime, and **0** otherwise. [6]
6. Write a program that reads in a positive integer **n**, and prints out the **n**-by-**n** triangle pattern. For example, for $n = 5$, the pattern will be [8]

```
xxxxx
 xxxx
  xxx
   xx
    x
```

7. Find the output of the following C program: [4]

```
#include <stdio.h>
int mystery(int,int);
int main()
{
    int x = 2, y = 5;
    y = mystery(x, y);
    printf("x=%d y=%d\n", x, y);
    x = mystery(y, x);
    printf("x=%d y=%d\n", x, y);
    return 0;
}
int mystery(int x, int y)
{
    x = 2*y;
    y=x;
    return x;
}
```