MINOR-1, COL100

Max marks: 90, Duration: 1 hour

Note: Spend a minute or two on each question to find an efficient solution before answering it.

1. [Marks 25]
   Write a C program to take a positive decimal number `N` and a base `B` as its input and print the representation of the number `N` in base `B` in reverse order, starting with the least significant digit and ending with the most significant digit of the representation. For example, if your input number `N` is 20 and base `B` is 2 then your program should output 00101 (since the base 2 representation of 20 is 10100). Assume that the input base `B` will always be between 2 and 10 and the number `N` will always be positive. You don't need to check if the input values are in the correct range.

2. [Marks 12]
   What will be the output of the following Linux commands on the file named MyFirst.txt whose contents are listed below.

```
my first program
include <stdio.h>
void main() {
    printf("Who am I?\n");
    return;
}
```

   (a) wc -l MyFirst.txt
   (b) grep m MyFirst.txt
   (c) grep st MyFirst.txt | sort
   (d) wc -l MyFirst.txt | wc -l

3. [Marks 12]
   Represent the following unsigned numbers using the base specified.

   (a) 1011001 is in base 2. Convert this number to base 8.
   (b) 0010102 is in base 3. Convert this number to base 5.
   (c) 7234112 is in base 8. Convert this number to base 2.
   (d) 4256711 is in base 9. Convert this number to base 3.

4. [Marks: 25]

Write a C program which takes a positive integer `N` as input from the user. The program finds the first `N` prime numbers and displays them in the manner shown below. For example, if `N` is 10, then the program prints the following:

```
The first 10 prime numbers are: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29
```

Note: You may use any number of while loops in your program. Other kinds of loops not covered in class, such as `for` loops, may not be used. Use proper indentation, and add a few comments to explain the main portions of the code. You may want to first work out the code in rough before writing your final solution. You may assume that the input number `N` will always be positive. You do not need to check if the input value is positive.

5. [Marks 16]

In the following C program, assume that a float variable uses 23 bits for the mantissa (using the normalized/optimized representation), 8 bits for the exponent and 1 bit for the sign. State in your answer

(a) the output of the program, and

(b) explain in your own words why this output is printed. If you are having difficulty in explaining in the English language, you may explain in Hindi (अगर आपको इंग्लिश भाषा में उत्तर देने में मुश्किल हो रही है तो आप इस प्रश्न का उत्तर हिंदी भाषा में दे सकते हैं).

```
#include <stdio.h>

int main()
{
  float a = 1.0, b = 4.0;
  int count=0;

  printf("Count=%d",count);

  while (a+b != a)
     {
      b=b/2;
      count=count+1;
      printf(", %d",count);
     } /* end while*/

  printf("\n");
  return 0;
} /* end main */
```

a = 1.0 b = 4.0

b = 2.0

2