Computer Science and Engineering
And
Information Technology
IIIT Kalyani, West Bengal

Operating System (CS 401): Spring: 2019-2020
2nd Year B.Tech.

Quiz - I (7th February, 2020)   *Time: 09:40-10:20 (Marks: 20)*

Answer at least 10 questions.

Note: The output of `$ ls -l` is records of the form
```
-rw-r--r-- 1 gb gb 87 Jan 25 05:13 abcd
```

1. What is the basic function of `awk`?

    Ans. Searches files for lines that contain certain *patterns*. When a line matches one of the *patterns*, `awk` performs specified *action* on the matched line and continues.

2. An `awk` program file `p2` contains `{ print }`.
    What is the output of `$ awk -f p2 test.c` ?

    Ans. It lists the content of `test.c`

3. The `awk` executable is available at `/usr/bin/awk`. How can you make a self-contained `awk` script?

    Ans. The first line should be `#! /usr/bin/awk -f` followed by the `awk` script. The file should be executable (`chmod +x file name`).

4. What is the output of `$ p4 mail-list` where the file `p4` contains
    ```
    #!/usr/bin/awk -f
    /gmail/
    ```

    Ans. Every line containing the substring `gmail`.

5. What is the output of the following `awk` code?
    ```
    ls -l | awk '{ if ($5 > 50) print $9 }'
    ```

    Ans. It prints the names of the files larger than 50 bytes under the current directory.

6. What is the output of the following code?
   ```
   $ awk '{ print }' test.c | awk '{ x += length($0) } END { print x }'
   ```
   Ans. It prints the number of characters in `test.c` excluding the *newline* (`\n`') *characters*.

7. What is the output of the following code?
   ```
   ls -l .. | awk '$1 ~ /^d/ { print $9 }'
   ```

   Ans. Lists the directory names under the parent directory.

8. What is the output of the following code?
   ```
   ls -l | awk '/\.c\+\+$|\.cpp$/ { x += $5 } END { print x}'
   ```

   Ans. The cumulative sizes of `*.c++` and `*.cpp` files in the current directory.

9. What will be printed by the following code?
   ```
   awk 'BEGIN { RS = "o" } END { print NR }' data1
   ```
   where the file `data1` contains
   "holdesobujorangutangitpatkelchitpotang"?

   Ans. 5 as there are five records separated by "o":
   ```
   h ldes buj rangutangitpatkelchitp tang.
   ```

10. If the file `data2` contains
    ```
    1 2 3 4 5
    10 20 30 40 50
    ```
    what will be printed by the following code?
    ```
    awk '{ $2 = 2*$2; $3 = $2+$3+$4 } { print $0 }' data2
    ```
    Ans. The output is
    ```
    1 4 11 4 5
    10 40 110 40 50
    ```

11. What is printed by the following code on the input 2 3 4?
    ```
    $ awk '{ x = 2; y = 3; print x^y }'
    2 3 4
    ```
    Ans. It computes $2^3 = 8$ and prints it. It does not depend on input.

12. What will be the output of
    ```
    $ p7
     1 5 3
    ```
    where the awk program file p7 is

    ```
    #!/usr/bin/awk -f
    # Factorial
    {
      a=1; b=1
      while ( a <= $2 ){
          b = a * b
          a = a + 1
      }
      print $2 "! = " b
    }
    ```

    Ans. `5!  = 120`

13. What is the output (do not bother about the order)?
    ```
    $ p8 data3
    ```
    where the awk program file p8 is

    ```
    { for(i = 1; i <= NF; ++i) c[$i]++ }
    END { for(x in c) printf "%s: %d ", x, c[x]; printf "\n" }
    ```

    and the content of data3 is
    ```
    aa bb, ba ab.  ab ba, aa.  bb ab.  bb aa ba.
    ```
    Ans. ab: 1 ba: 1 bb: 2 aa.: 1 ab.: 2 ba,: 1 bb,: 1 ba.: 1 aa: 2

14. What is the output of the following program?
    ```
    $ awk -e '{ for(i=1; i <= NF;printf "%s ", abc($i) }' -f p9
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    ```
    where awk program file p9 contains

    ```
    function abc(x) {
       if (x == "") return ""
       return (abc(substr(x, 2)) substr(x, 1, 1))
    }
    ```

    Ans. `TIII ,inaylaK tseW lagneB`