Assignment # 1 (B)

Course Title	Digital Image Processing	Due Date: 23/02/2022

Instructions:

1. Assignments are to be done individually. You must complete this assignment by yourself. You cannot work with anyone else in the class or with someone outside of the class.
2. You can use any programming language of your choice, such as Python, MATLAB, or C++, etc.
3. Plagiarism of any kind (copying from others and copying from the internet, etc.,) is not allowed.
4. You can use OpenCV or similar library for most of the tasks in this assignment. However, if you are prohibited to use any library for any particular task then you cannot use any library for that task.
5. Your code must be properly commented.
6. The data required for this assignment is also provided.
7. Any assignment submitted even one second late will be considered **LATE** and **ZERO** will be provided.
8. No marks will be assigned if any of the following deliverables are missing.
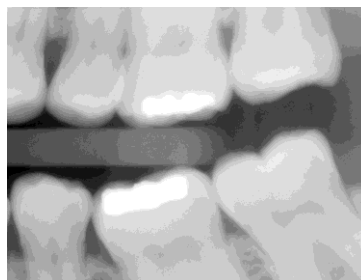
Deliverables:

1. The source code of the program.
2. A pdf or word report containing a brief explanation of the steps involved in the program (each question) and the results obtained for their respective input images.

Put both source code and report in one folder, ZIP it and submit it. Your folder must be named as below:

ROLLNO_NAME.ZIP

Question 1.

a. Write a function to separate teeth from the rest of the areas

b. For the above x-ray image, the very high intensity (brightest) shows there is an issue in the teeth. Write a code that separates this region within the teeth and show this affected part in red color in the output image while the rest of the pixels will remain the same.

c. Write a function that finds the percentage of the pixels that are affected in this image.

Question 2.

a. For the above human brain image, you need to apply intensity slicing to separate the bright part from the rest of the brain and the background. This step will result in a binary image. Display the binary image and original image side by side along with the original image.

b. For the output binary image obtained in a), count the number of white pixels in each row and store in a 1-D array. Plot the data in this array using any plot function.

c. Similarly, do the same task as in b) for all columns in the output image. Count the number of pixels in each column and then plot it.

Question 3.
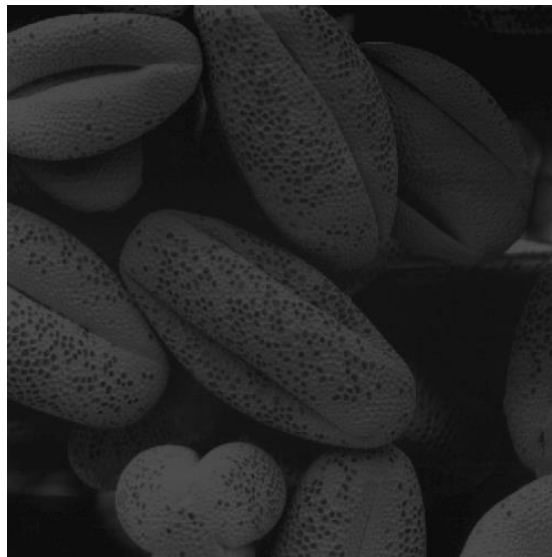
Apply different log transformations to enhance the above image. For each transformations show the output and also display the values of parameters in the title of the image. Describe which log transformation and which parameters produced the best results.

Question 4.

a. Write a function without using any library to count each intensity value in the image. This will give you count of how many times a particular pixel is repeating (counting). Finally, using any library plot these values.

b. Use two custom Box-filters of these sizes: 7x7 and 3x3. Let original image be I, output of 7x7 filter be O_7 and output O_3. Find the final output as follows and display the resulting image.

$$Final\_output = I - Absolute\ (\ O_7 - O_3\ )$$

Question 5.
You are given two images of a syrup. We can see that one syrup is completely filled while the other one is not properly filled. Write a function that takes an image as input and prints the filled percentage of the bottle. If the filled percentage is less then threshold it should also display a message "Bottle is not properly filled", otherwise, it will display a message "Bottle is properly filled."