Underwater robots play an important role in oceanic geological exploration, resource exploitation, ecological research, and other fields. Unfortunately, due to low contrast and color distortion the quality of underwater image could be very poor. Implement a method able to enhance underwater images such the one reported below.

Write a MATLAB script able to perform the following operations:

a) Read an underwater color image saved in file *'test_image.png'*.
b) Resize the color image in order to obtain a 256x256 image and visualize it.
c) Convert the color image into the Hue (H) Saturation (S) Value (V) color space.
d) Apply to V a linear transformation in order to cover the whole [0,1] range (*hint: use the minimum and maximum values of V*).
e) Convert the new HSV image, obtained combining the original H and S and the new transformed V, in the RGB color space.
f) Apply a histogram equalization to each channel of the newly obtained RGB image.
g) Obtain the output image by applying a Gaussian low-pass filter to each channel of the image obtained in f). Use a 3x3 kernel with 0.5 as the standard deviation, assuming you are using values in [0,1] in order to represent the images.
h) Visualize the output image.

```
clc
close all
clear all

%a)
I_RGB = imread('test_img.png');

%b)
I_RGB = imresize(I_RGB,[256 256]);
figure()
imshow(I_RGB)

%c)
I_HSV = rgb2hsv(I_RGB);

%d)
V = I_HSV(:,:,3);
min_v = min(V(:));
max_v = max(V(:));
V_new = (V - min_v)/(max_v - min_v);

%e)
I_HSV_2 = I_HSV;
I_HSV_2(:,:,3) = V_new;
I_RGB_2 = hsv2rgb(I_HSV_2);

%f)
R = histeq(I_RGB_2(:,:,1));
G = histeq(I_RGB_2(:,:,2));
B = histeq(I_RGB_2(:,:,3));
I_RGB_3(:,:,1) = R;
I_RGB_3(:,:,2) = G;
I_RGB_3(:,:,3) = B;

%g)
h = fspecial('gaussian',3,0.5);
R = imfilter(R,h,'symmetric','conv');
G = imfilter(G,h,'symmetric','conv');
B = imfilter(B,h,'symmetric','conv');
I_RGB_4(:,:,1) = R;
I_RGB_4(:,:,2) = G;
I_RGB_4(:,:,3) = B;

%h)
figure()
imshow(I_RGB_4)
```