ASSIGNMENT – 3
Theoretical Solutions

PART I:

Question 1:

Since the intensity of red is 0.5, blue is 0.5 and green is 1. The person would see a higher intensity of green color.

Question 2:

a) Since the hue values are in the range of 0 to 360. We can determine the values of the hue of a particular color by $\frac{x}{360} * 255$. The gray level values for yellow is 43 and that of green is 85 as provided in the region. For the blue region, by applying the above formula and putting the value of x = 240 we can get the hue value of blue to be 170. Similarly, for magenta we can put the value of x = 300, we can obtain the hue value to be 213 for magenta. For the black region, the value is 0 because there is an equal amount of red, green, and blue is present at the center and for the white region since there is no presence of red, blue, or green the value is 0 as well.

b) Since the center region is black, the gray level of the center region is 0 and the remaining region is completely saturated and hence the gray level of that region will be 255.

c) The Darker gray regions will have equal intensity of 85 and the lighter gray regions will be a combination of two colors hence the intensity will be 85+85=170. The white region at the center will be a combination of three colors which will be equal to 85+85+85=255. The black region denotes the absence of any color in that region.

Question 3:

a) The hue values for red are 0, green is 0.33 and blue is 0.66. Since it is given in the question that the images are fully saturated, the saturation value will be 1. Since all the colors have the highest intensity. The intensity values for each color would be 1/3

b) Since the saturation value is constant and fully saturated to 1. Applying the averaging mask won't produce any effect and the image would remain unchanged.

c) Applying the smoothing mask on multiple color regions will produce a blurring effect. The values for red and green color may vary between 0 and 0.33. The values for green and blue will be 0.33 and 0.66

PART II:

Question 1:

a) 8-point DCT coefficients for the provided values:
32.5269, -1.28004, -1.30808, 0.451451, -1.41556, -0.299427, 0.53958, 0.256746
0.353553, 4.25056, 0.349879, 5.04607, 2.47477, 8.38362, 1.76836, 20.3847

b) 16-point DCT coefficients for provided values:
23.25, 21.7789, -3.91072, -6.95739, -0.677559, 6.03749, -3.24868, -2.56978, 0.748883, 3.16009, -6.14024, 1.60626, 1.6324, 5.50021, -14.2338, 13.5486

c) 16-point DCT provides greater compression and provides more blur effect, since the coefficients are smaller than the values of 8-point DCT.