



Answer the following *Four* question:

Question 1 (20 Marks)

- (a) Draw each of the RGB and CMY color cubes.(Identify names of colors on your answer)
- (b) Suppose we have a 8-bit grayscale image. What size of ordered dither matrix do we need to display the image on a 1-bit printer?
- (c) Write down an algorithm (pseudocode) for Mask certain shape in an image.
- (d) Color inkjet printers use the CMY model. When the cyan ink color is sprayed onto a sheet of white paper,
 - (i) Why does it look cyan under daylight?
 - (ii) What color would it appear under a blue light? Why?

Question 2 (20 Marks)

- (a) Scientifically, what is meant by: “the color, visible to humans, is out-of-gamut for our display”? How it can be maintained?
- (b) Color models in images differ from the color model of Video. Mention the types of color model for image and video.
- (c) Sampling and Quantization are two important steps for Sound signal. Comment with drawing.
- (d) Compute the Signal-to-Noise Ratio (SNR) for an Audio signal, if the signal amplitude A signal is 10 times the noise.

Question 3 (16 Marks)

- (a) Mention the three Types of Video Signals. Also, mention main formats of videos.
- (b) What are the most salient differences between ordinary TV and HDTV?
- (c) Draw a diagram shows the effect of "vertical retrace & sync" and "horizontal retrace & sync" on the NTSC video raster.
- (d) NTSC video has 525 lines per frame and 63.6 μ sec per line, with 20 lines per field of vertical retrace and 16.6 μ sec horizontal retrace.
- (i) Where does the 63.6 μ sec come from?
- (ii) Which takes more time, horizontal retrace or vertical retrace? How much more time?

Question 4 (14 Marks)

- (a) Express in steps the algorithm of the Arithmetic Coding Encoder for lossless compression.
- (b) What is difference between Lossless Compression and Lossy Compression? Mention different types of algorithms for each Lossless and Lossy compression techniques
- (c) Consider the dictionary-based **LZW** compression algorithm. Suppose the alphabet is the set of symbols {0,1}. Given the input:

0 1 1 0 0 1 1

Show the dictionary (*symbol sets plus associated codes*) and output for **LZW** compression for that input.

With my best wishes

Dr. Ghada Hamisa
Faculty of Engineering
(Computer & Control Dept.)