Kafrelsheikh University **Faculty of Engineering** **Electrical Engineering Dept.** **Subject: Multimedia** **(Full Mark: 70 Marks)**		**Third Year Student** **Computer & Control System Dept.** **Final Exam** **Date: 29 / 12 / 2019** **Time Allowed : 3 hours**

Course Code **ECS3111**	**The Multimedia course intend the following iLOS according to (NARS 2009):** **a (8, 11, 14, 15) - b (8, 14, 18) - c (14, 15) - d (2, 6, 7, 8)**

Answer the following _Four_ question: (In _two_ Pages)

Question 1 _(20 Marks)_

(a) Mention briefly the main parameters that affect the visibility of colors.

(b) What is Dithering? Discuses its main strategy. Give some uses for it.

(c) Suppose we have available 24 bits per pixel for a color image. However, we notice that humans are more sensitive to R and G than to B — in fact, 1.5 times more sensitive to R or G than to B. How could we best make use of the bits available?

(d) What is Gamma Correction? By drawing, explain the effect of CRT on light emitted from screen before and after gamma correction.

(e) 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 _(15 Marks)_

(a) To make matters simpler for eventual printing, we buy a camera equipped with CMY sensors; as opposed to RGB sensors (CMY cameras are in fact available).

  i. Draw spectral curves depicting a camera's sensitivity to frequency.

  ii. Could the output of a CMY camera be used to produce ordinary RGB pictures? How?

(b) Digital video uses _chroma subsampling_. What is the purpose of this? Draw the chroma sampling schema that represents the chroma pixel values per four original pixels.

(c) NTSC video has 525 lines per frame and 63.6 Msec per line, with 20 lines per field of vertical retrace and 10.9 Msec horizontal retrace.

  i. Where does the 63.6 Msec come from?

  ii. Which takes more time, horizontal retrace or vertical retrace? How much more time?

(d) Color models in images differ from the color model of Video. Mention the types of color model for image and video. And most famous application for both.

Question 3   (20 Marks)

(a) i. Scientifically, what is meant by: "the color, visible to humans, is out-of-gamut for our display"?

ii. How it can be maintained?

iii. Draw the CIE chromaticity diagram for monitor color in-gamut and printer gamut.

(b) There are two ways for representing Analog Video. Compare between them in details (with drawing if possible). Mention types of Analog TV systems.

(c) -What are the most salient differences between ordinary TV and HDTV?
-What was the main impetus for the development of HDTV?
-Mention the main parameters to specify digital video.

(d) Sampling and Quantization are two important steps for Sound signal. Comment with drawing.

(e) Compute the Signal-to-Noise Ratio (SNR) for an Audio signal, if the signal amplitude A signal is 20 times the noise.

Question 4   (15 Marks)

(a) Express in steps the algorithm of the Dictionary-based Coding (LZW) encoder for lossless compression.

(b) What is difference between Lossless Compression and Lossly Compression? Mention different types for each Lossless and Lossly compression techniques.

(c) In Lossless JPEG compression, *The Predictive method* is used to predict the values of pixels. Explain this statement and draw a diagram that express the method.

(d) Study the following strings and answer the question below:

S1 = 1 1 1 12 1 23 54 54 56 3 111 111 111   ,   S2 = 1 5 6 8 9

i.   Perform the *Run length compression* algorithm for S1 and S2

ii.   Calculate the compression ratio for each code. Which one is the best case?why?

(e) Based on the following symbols and associated probabilities (in brackets):

A(0. 5) B(0. 15) C(0. 15) D(0. 1) E(0. 1)

Form *Huffman Tree for that* problem.

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