Kafrelsheikh University Faculty of Engineering Electrical Engineering Dept. Subject: Multimedia (Full Mark: 70 Marks)		Third Year Student Computer & Control System Dept. Final Exam Date: 7 / 3 / 2021 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   *(10 Marks)*

(a) Write short notes about different types of image. Mention the formats of images.

(b) What is the difference between multimedia editing and authoring? Give at least one example for each.

(c) Suppose we have a 5-bit grayscale image. What size of ordered dither matrix do we need to display the image on a 1-bit printer?

(d) "The color, visible to humans, is out-of-gamut for our display"

   i. Explain scientifically, what is meant by this statement.

   ii. How it can be maintained?

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

Question 2   *(15 Marks)*

(a) Consider the following set of color-related terms:

    (a) Wavelength   (b) Color level   (c) Brightness   (d) Whiteness

How would you match each of the following (more vaguely stated) characteristics to each of the above terms?

    (a) Luminance   (b) Hue   (c) Saturation   (d) Chrominance

(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) Draw a diagram shows the effect of "vertical retrace & sync" and "horizontal retrace & sync" on the NTSC video raster.

(d) 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.

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

(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) i. Compare between the three main Analog Broadcast TV Systems. (Frame Rate, Number of scan lines, Total Channel width and Bandwidth Allocation)

ii. 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 100 times the noise.

Question 4 *(25 Marks)*

(a) What is meant by *"Entropy"*? Mention its important in data compression. What is meant by smaller entropy?

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

(c) One of the algorithms of Lossless JPEG compression is *The Predictive method* .

i) What is the important of that method? Mention its types.

ii) Draw a diagram that express the method.

(d) Consider the following statement:

<div align="center">

TTTTPPPCCCCPPPTTCCPPP

</div>

i. Use the *Run-Length Code* compression technique to reduce the memory without loss the information source.

ii. Compare between the original and the compressed message (mention your point of view)

(e) Given the following message:

<div align="center">

engineer

</div>

i. Construct the coding tree using the Variable-length coding technique (*Shannon-Fano technique*) for the above message.

ii. Calculate the entropy and minimum number of bits used to code the above message.