Vavuniya Campus of the University of Jaffna

Second Examination in Information Communication Technology - 2017

(Technology Stream)

Second Semester - March/April 2019

TICT2242-Multimedia Design and Technologies

Answer Four Questions Only

Time Allowed: Two hours

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1. (a) Define the term *Multimedia* in computing. Briefly describe three applications of multimedia. [20%]

   (b) Describe *multimedia system* and its basic characteristics. [15%]

   (c) Identify the key issues or challenges that a multimedia system need to deal with and the prerequisites for a multimedia system to overcome the issues or challenges. [25%]

   (d) Explain the term *HyperMedia* and its uses in World Wide Web(WWW). [10%]

   (e) What is the use of *HyperText Transfer Protocol(HTTP) and HyperText Markup Language(HTML)* in multimedia transmissions? [10%]

   (f) Explain how images or graphics are represented digitally in computers. [10%]

   (g) Explain how the pixel information or colour information are stored in 8-bit Color Images. [10%]

2. (a) Briefly describe four graphic file formats used to represent it in computers. [20%]

(b) Consider an image with the size of 1600 x 1200px. Calculate the minimum amount of storage (in KB) that you require to store the image file with no compression for each of the following image data representations:

i. Grey level images. [10%]

ii. 24-bit color images. [10%]

(c) Explain *media composition* in your own words. [10%]

(d) *Text editor* is a tool that allows a user to create and revise document in a computer.

i. Briefly describe five broad categories of *text editors* depending on the editing and its output. [15%]

ii. Describe the main aspects that a developer has to take into account while designing a text editor. [15%]

(e) Distinguish between *Vector Graphics Editors* and *Raster Graphics Editors*. [10%]

(f) Briefly describe the features of image viewers. [10%]

3. (a) Write down the *Huffman Encoding Algorithm*. [10%]

(b) You are given the following message, for which the size of each character is one byte.

`can you can a can as a canner can can a can?`

i. Find the size of the message with no compression. [10%]

ii. Find the size of the encoded message using fixed length encoding. [10%]

iii. Show how you use Huffman encoding scheme to encode the message and find the size of encoded message. [20%]

iv. Calculate and compare the compression ratio obtained in part b(ii) and b(iii). [10%]

[Question 3 is continued on the next page]

(c) Encode the following bitmap image using Run-Length Encoding Scheme:

$$\begin{pmatrix} 0 & 0 & 0 & 0 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 & 1 & 1 & 1 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 & 1 & 1 & 1 & 1 \end{pmatrix}$$

[15%]

(d) Describe what is meant by *Interactive Media* in computer systems. [10%]

(e) Briefly describe five applications of Interactive Video. [15%]

4. (a) Explain the step-by-step procedure of *JPEG Encoding Scheme* with aid of a diagram. [30%]

(b) Briefly describe each of the following techniques of *Audio Compression*.

i. Predictive encoding. [10%]

ii. Perceptual encoding. [10%]

(c) What is the use of *JPEG encoding* in video compression? [10%]

(d) Differentiate between *spatial compression* and *temporal compression* in MPEG encoding scheme. [20%]

(e) An 8-bit colour image of size 3 x 4 inches is scanned in 300dpi resolution. The image is then compressed with the compression ratio 1:20 using JPEG encoding scheme and uploaded on a web site. Calculate the total time required to download the image where the typical transfer rate is 800 bytes/sec. [20%]

5. (a) Describe what is the difference between file downloading and streaming media. [10%]

(b) i. Briefly describe each of the categorization of the streaming technologies based on the casting protocol. [15%]

ii. Compare and contrast the advantages and disadvantages identified in each of the above technologies. [15%]

(c) Write a typical scenario to explain video buffering occurred during streaming. [10%]

(d) A High Definition video file is stored on a server for on demand streaming and this stream uses unicast protocol. The total length of the video is 20s, and it plays in 4 frames/sec rate while each frame is of size 720 x 1280 px. The server receives 100 requests from the users.

i. Find what is the buffer size. [10%]

ii. Find the required number of bandwidth. [10%]

iii. Find what is the estimated live streaming total traffic. [10%]

(e) Differentiate *virtual reality* and *augmented reality*. [10%]

(f) Briefly explain three applications of *virtual reality*. [10%]