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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2015/2016**

COURSE NAME : MULTIMEDIA TECHNOLOGY
AND APPLICATION
COURSE CODE : BEC 20202
PROGRAMME : BACHELOR OF ELECTRONIC
ENGINEERING WITH HONOURS
EXAMINATION DATE : DECEMBER2015/JANUARY 2016
DURATION : 2 HOURS
INSTRUCTION : ANSWER ALLQUESTIONS

THIS QUESTION PAPER CONSISTS OF **FIVE (5)**PAGES

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- Q1** (a) What is the difference between Vector graphic and Bitmap graphic?
(1 mark)
- (b) A digital image is a picture that has been digitized or stored as numbers by a computer. When a digital image is displayed on the computer screen, its size is determined by screen resolution, screen size, and the number of pixels. If the monitor has a pixel addressability of 800×600 :
- (i) How big will the image be if displayed on 300 dpi monitor and 120 dpi monitor? Show your calculation in inch.
(10 marks)
- (ii) Conclude your findings for Q1(b)(i)
(2 marks)
- (iii) Calculate the minimum amount of display memory required in kilobytes (KB) on its adapter card to display an image of RGB color mode and 8-bit Grayscale color mode on the screen.
(10 marks)
- (iv) Conclude your findings for Q1(b)(iii).
(2 marks)
- Q2** (a) Sound comprises the spoken word, voices, music and even noise. It is a complex relationship involving a vibrating object (sound source), a transmission medium (usually air), a receiver (our ear) and a preceptor (our brain).
- (i) Differentiate between analog signals and digital signals?
(2marks)
- (ii) Differentiate between loud and normal sound wave?
(2marks)

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(iii) Differentiate between noise and pleasant audio wave?
(2marks)

(b) An *audio-CD* is a compact disc that stores sound information such as music or speech. Assume that you have an *audio-CD* which its sampling is done at 44.1 kHz, 16-bit resolution and stereo mode. If the audio-CD has 30 seconds sound clip:

(i) Calculate the uncompressed audio's size in kilobytes.
(5 marks)

(ii) Recommend storage space needed to store file of Q3(b)(i).
(2 marks)

(iii) Suggest bit-rate that should be supported by the system for smooth playback. Show your calculation in Mbits/sec.
(6 marks)

(iv) Compare your findings in Q3(b)(i) to (iii) with another audio-CD that has the same amount of sound clip but the sampling is done at 5.5kHz, 8-bit resolution and mono mode. The comparison must include:
▪ uncompressed audio's size produced
▪ size of storage required
▪ bit rate needed for smooth playback
(6 marks)

Q3 (a) The question (i) and (ii) evolved around video technology.

(i) If you are given the following list:
▪ PAL
▪ TMF
▪ SECAM
▪ AMT
▪ NTSC
▪ MTF

Several methods are available for signals: the most common form the transmission of video being analog video in the form of television. There are standards used for analog broadcast colour television. Identify which

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three (3) of listed items above are television broadcasting standard, and which is the analog broadcasting standard for Malaysia?

(4 marks)

(ii) Digital video is the digitization of analog video signals into numerical format. It creates the illusion of full motion by displaying a rapid sequence of changing images on a display device. List and briefly describe three (3) basic characteristics of digital video.

(6 marks)

(b) Analog video is video information that is stored using television video signals, film, videotape, or other non-computer media. Analog video is important because it defines where the digital content will come from and what will be required for the computer to access it. Explain in one sentence for each of the following terms.

(i) composite video

(2 marks)

(ii) component video

(2 marks)

(c) In 2015, YouTube started to offer 8K resolution video. The Full Ultra HD (FUHD) or Ultra-high-definition television includes 4K UHD (2160p) and 8K UHD (4320p), which are two digital video formats proposed by NHK Science & Technology Research Laboratories and defined and approved by the International Telecommunication Union (ITU). If we ought to use the FUHD that forming the total image dimensions (7680×4320) in the future, measure the uncompressed file size in gigabyte of a normal 2-hour movie with 60 frames per second and a color depth of each frame is 32 bits.

(11 marks)

Q4 (a) Compression algorithms can be divided into two basic types: lossless compression and lossy compression. Entropy encoding is an example of lossless compression. Explain in detail what is entropy encoding.

(5marks)

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(b) RLE scheme is a simple and fast lossless compression technique and is more suitable to be applied to image data.

(i) Produce the run-length encoding for the following sequence.

255 255 258 243 243 244 243 245 243 247 240 242 240 243 240
239 239 239 239 239

(7 marks)

(ii) Calculate its compression ratio. Show your works.

(6 marks)

(iii) Given a run-length encoding for a sequence of 20 data is (255,20). Compare this file size with the compressed sequence's result in (Q4)(b)(ii). Which RLE compressed result generates a bigger file size?

(2 marks)

(c) Entropy encoding and arithmetic encoding are two examples of lossless compression technique, which provided higher compression ratio compared to RLE scheme. Compare between the entropy encoding and arithmetic encoding.

(i) Provide one similarity of these two compression methods.

(1 mark)

(ii) Differentiate these two compression methods.

(4 marks)

- END OF QUESTIONS -