KIBABII UNIVERSITY COLLEGE

UNIVERSITY EXAMINATION

BIT 325: MULTIMEDIA TECHNOLOGIES

Instructions

Question ONE is compulsory

Attempt any TWO questions in SECTION B

SECTION A: COMPULSORY

QUESTION ONE (30mks)

a. Briefly explain the following concepts
   i. Multimedia and hypermedia [2mks]
   ii. Nyquist sampling theorem [2mks]

b. State and explain **three** types of text used to produce pages in a document [6mks]

c. State and explain the **three** main properties of colour source that an eye makes of. Hence explain the meaning of the terms "luminance", "colour difference" and chrominance. [6mks]

d. Most high resolution computer monitors are not based on TV picture tubes. What is the amount of memory that is required to store an image given a display size of **1280 X 1024?** Derive the time to transmit the image assuming bit rate of **56 kbps**. [4mks]

e. Given a character set and associated probability below, derive the codeword value for the character string **CAEE$** using **arithmetic coding** compression scheme. Assuming this is received at the destination, explain how the decoder determines the original string from the received codeword value. [10mks]

SYMBOL	PROBABILITY	RANGE
A	0.2	[0 to 0.2]
B	0.1	[0.2 to 0.3]
C	0.2	[0.3 to 0.5]
D	0.05	[0.5 to 0.55]
E	0.3	[0.55 to 0.85]
F	0.05	[0.85 to 0.90]
$	0.01	[0.90 to 1.0]

SECTION B: Attempt two questions

QUESTION TWO (20mks)

a. A series of messages is to be transferred between two computers using a public switched telephone network (**PSTN**). The message comprise of just characters **A** through **F**. Analysis has shown that the probability(relative frequency of occurrence) for each character is as follows:
A = 0.3, B = 0.25, C = 0.20, D = 0.10, E =0.10, F = 0.05

   i. Use Shannon's formula to derive the minimum average number of bits per character [3mks]
   ii. Use Huffman coding to derive a codeword set hence construct a corresponding Huffman code tree. [7mks]
   iii. Derive the average number of bits per character for your codeword set [3mks]

b. Explain where and how you would use magnetic storage in a multimedia system [6mks]

QUESTION THREE (20mks)

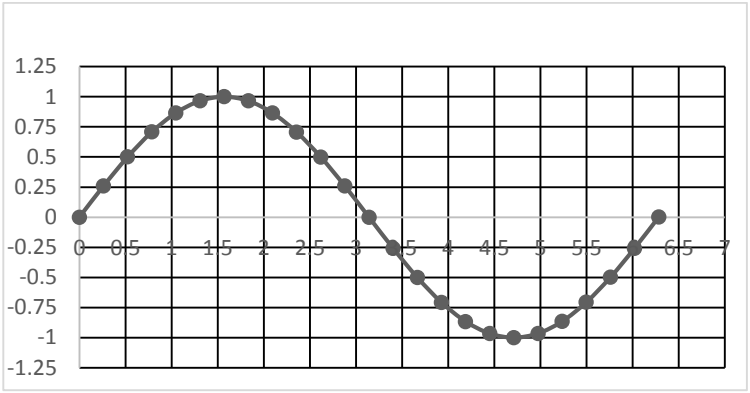
a. What are the components of **MPEG** audio scheme? [6mks]

b. With an aid of diagrams, describe the raster scan operation of TV/computer monitors. Include the following terms in your description: line scan, retrace, phosphor triad, frame refresh, pixel depth, video RAM and video controller [8mks]

c. Describe the multimedia systems development lifecycle [6mks]

QUESTION FOUR (20mks)

a. In order to get video/audio into the computer, they need to be digitized. Clearly explain the **encoder design** involved in the digitization process and apply the encoder steps on the following signal, in a suitable manner, showing the resulting signal at each step. [12mks]



b. Describe Huffman encoding algorithm [8mks]

QUESTION FIVE (20mks)

a. Explain the following terms
   i. Entropy encoding [2mks]
   ii. Source encoding [2mks]
   iii. Transform encoding [2mks]
b. State and explain the main media types that constitute multimedia [8mks]
c. Explain THREE categories of multimedia applications [6mks]