MACHAKOS UNIVERSITY

University Examinations for 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

FOURTH YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (MATHEMATICS AND COMPUTER SCIENCE)

BACHELOR OF SCIENCE (STATISTICS AND PROGRAMMING)

BACHELOR OF SCIENCE (MATHEMATICS)

SCO 490: MULTIMEDIA TECHNOLOGIES

DATE: 2/8/2017 **TIME: 2.00-4.00 PM**

INSTRUCTIONS

Answer Question One and Any Other Two Questions

QUESTION ONE (COMPULSORY) (30 MARKS)

a) What is meant by the terms Multimedia and Hypermedia? Distinguish between these two concepts. What is a multimedia system? (4 marks)

b) What is data compression? Why is it necessary for Multimedia activities? (4 marks)

c) What is the distinction between lossless and lossy compression? What broad types of multimedia data are each most suited to? (6 marks)

d) What is meant by the terms frequency and temporal masking of two or more audio signals? Briefly, what is the cause of this masking? (8 marks)

e) Briefly describe the four basic types of data redundancy that data compression algorithms can apply to audio, image and video signals. (8 marks)

QUESTION TWO (20 MARKS)

a) Briefly explain how the human visual system senses colour. How is colour exploited in the compression of multimedia graphics, images and video? (6 marks)

b) What are the key distinctions between multimedia data and more conventional types of media? (4 marks)

c) What key issues or problems does a multimedia system have to deal with when handling multimedia data? (4 marks)

d) What are the differences between analog signals and digital signals? (4 marks)

e) How do you convert from 24-bit colour to an 8-bit colour look up table representation? (2 marks)

QUESTION THREE (20 MARKS)

a) What extra information is multimedia good at conveying with respect to conventional media? Specifically:

   i. What can spoken text convey that written text cannot? (3 marks)

   ii. When might written text be better than spoken text? (3 marks)

b) Describe using an example how an analogue audio signal is digitized (4 marks)

c) Describe using an example how a digital signal is quantized (4 marks)

d) Explain the application and use of multimedia in education, communication and entertainment industries (6 marks)

QUESTION FOUR (20 MARKS)

a) Explain THREE main tasks of media players. (6 marks)

b) What advantages does the arithmetic coding algorithm offer over Huffman coding algorithm with respect to data compression? Are there any disadvantages with the arithmetic coding algorithm? (4 marks)

c) Explain the following multimedia related terms:

   i) Bit depth (2 marks)
   ii) Pixel (2 marks)
   iii) Frame buffer (2 marks)
   iv) Bitmap (2 marks)
   v) lookup table (2 marks)

QUESTION FIVE (20 MARKS)

a) Explain the reason why an animation or movie would require more memory storage area as compared to text. (4 marks)

b) Explain what makes loss concealment techniques feasible for digital video (4 marks)

c) Describe how the JPEG algorithm exploits the features of the human visual system to achieve high levels of compression while minimizing visual distortion (6 marks)

d) When performing lossy audio encoding there is a trade-off between the amount of space used and sound quality. Describe the MPEG approach to lossy audio compression (6 marks)