



MACHAKOS UNIVERSITY

University Examinations 2017/2018

EXAMINATION FOR BSC COMPUTER SCIENCE

SCO414 : MULTIMEDIA TECHNOLOGIES

SUPPLEMENTARY

DATE: AUGUST 2018

TIME: 2 HOURS

Instructions: Answer Question ONE and any other TWO Questions

QUESTION ONE (30 marks)

- a) **Explain** the main *advantages* of multimedia systems. **4 Marks**
- b) In terms of computing, explain Four fundamental multimedia attributes **4 Marks**
- c) Explain the forces driving the multimedia revolution **4 Marks**
- d) Distinguish the following terms Hue, Saturation, Brightness and Luminance **4 Marks**
- e) JPEG 2000 is a wavelet based image compression, explain its capabilities **4 Marks**
- f) Briefly describe, using a suitable diagram, the MPEG-1 audio compression algorithm **6 Marks**
- g) Define *chroma subsampling*? What is the benefit of performing *chroma subsampling* in image/video data compression and why is it an *appropriate approach* to take? **4 marks**

QUESTION TWO

- a) Describe the differences between data hiding, watermarking, and steganography. What are their respective applications and requirements? Is one a special case of another? **6 marks**
- b) The following are some possible applications of watermarking. Describe what they are and their requirements. **8 marks**
 - a. Ownership assertion
 - b. Fingerprinting
 - c. Copy prevention and control
 - d. Detection of unauthorized alteration (authenticate integrity of the data)
- c) i)What is steganography? **2 marks**
ii)What are the design objectives for a steganography system? **4 marks**

QUESTION THREE

- a) i) What is steganalysis? 2 marks
- ii) What are the design objectives for a steganalysis system? 4 marks
- iii) What are the two types of steganalysis techniques? 4marks
- b) i) What is the key difference between I-frames, P-frames and B-frames in MPEG-2 video compression? 6 marks
- ii) What is MIDI?.What features of MIDI make it suitable for use in the MPEG -4 audio compression standard? 4 marks

QUESTION FOUR

- a. State Nyquist's Sampling Theorem 2 marks
- b. What general considerations affect the selection of the sampling rate in multimedia data? 4 marks
- c. For each of the following media types:audio,graphics,images and video, briefly discuss how sampling affects the quality of the data,the cause of sampling artefacts, and the form in which they manifest themselves in the each data modality. 9 marks
- d. Explain briefly why JPEG compression is not always suitable for compression of images that contain sharp edges or abrupt changes of intensity(such as black text on a white background). 5 marks

QUESTION FIVE

- a) Explain the **Huffman Coding** Algorithm. 4 Marks
- b) Compare and contrast between the **JPEG2000** and **JPEG** standards. 6 Marks
- c) How does the human eye sense colour? What characteristics of the human visual system can be exploited for the compression of colour images and video? 4 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