



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

FOURTH YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)

SCO 490: MULTIMEDIA TECHNOLOGIES

DATE: 21/10/2020

TIME: 8.30-10.30 AM

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 evolution (4 marks)
- d) Distinguish the following terms Hue, Saturation, Brightness and Luminance (4 marks)
- e) Explain Various multimedia Authoring tools (4 marks)
- f) List three distinct classes of digital audio effect that use modulation as the prime method to achieve the desired effect. Give an example of a digital audio effect for each class. (6 marks)
- g) What is the YUV colour model? How is compression achieved with the YUV model in Analog PAL Video and Digital Images/Video? (4 marks)

QUESTION TWO (20 MARKS)

- a) How does the human eye sense colour? What characteristics of the colour sensory operators of human visual system can be exploited for the compression of colour images and video? (6 marks)
- b) The following are some possible applications of watermarking. Describe what they are and their requirements. (8 marks)
 - i. Ownership assertion

- ii. Fingerprinting
 - iii. Copy prevention and control
 - iv. Detection of unauthorized alteration (authenticate integrity of the data)
- c) i What is MIDI? (2 marks)
- ii What are the two main kinds of MIDI messages? (4 marks)

QUESTION THREE (20 MARKS)

- 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 staganalysis techniques? (4 marks)
- b) i What is the key difference between I-frames, P-frames and B-frames in MPEG-2 video compression? (6 marks)
- ii Describe how you would achieve the following digital audio processing tasks using Fourier-based signal processing approaches: Remove a constant mains hum present at between 50-60Hz from an audio signal. (4 marks)

QUESTION FOUR (20 MARKS)

- a) State Nyquist's Sampling Theorem (2 marks)
- b) Describe using a diagram video production process (6 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. (7 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 (20 MARKS)

- a) Describe using a diagram Audio production process (6 marks)
- b) Name FOUR ways of Audio Editing (4 marks)
- c) What is 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)
- 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)