



MACHAKOS UNIVERSITY

University Examinations for 2020/2021

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

FOURTH YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (MATHEMATICS AND COMPUTER SCIENCE)

SCO 490: MULTIMEDIA TECHNOLOGIES

DATE: 9/8/2021

TIME: 2:00 – 4:00 PM

INSTRUCTIONS: Answer Question ONE and any other TWO Questions

QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Explain the meaning of the following concepts as used with multimedia (8 marks)
 - i) Multimedia authoring
 - ii) Pulse code modulation (PCM)
 - iii) Quantization of Audio
 - iv) Digitization of sound
- b) Explain the main *advantages* of multimedia systems. (4 marks)
- c) In terms of computing, explain any three fundamental multimedia attributes (3 marks)
- d) Explain the forces driving the multimedia evolution (4 marks)
- e) Distinguish the following terms Hue, Saturation, Brightness and Luminance (4 marks)
- f) Explain various multimedia Authoring tools (4 marks)
- g) Explain the key differences between I-frames, P-frames and B-frames in MPEG-2 video compression. (3 marks)

QUESTION TWO (20 MARKS)

- a) Explain how the human eye sense colour (4 marks)
- b) The following are some possible applications of watermarking. Describe what they are and their requirements. (6 marks)
 - i. Ownership assertion
 - ii. Fingerprinting
 - iii. Copy prevention and control
- c) i) What is MIDI (2 marks)
ii) What are the two main kinds of MIDI messages (4 marks)
- d) State components of multimedia (4 marks)

QUESTION THREE (20 MARKS)

- a)
 - i) Define the term steganalysis (2 marks)
 - ii) Explain design objectives for a steganalysis system (4 marks)
 - iii) Explain the two types of steganalysis techniques (4 marks)
- b)
 - i) Explain the various application of multimedia technology (6 marks)
 - ii) Explain why lossy data compression is sometimes preferred over lossless (4 marks)

QUESTION FOUR (20 MARKS)

- a) State Nyquist's Sampling Theorem (2 marks)
- b) Using an appropriate diagram, describe various video production process components (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 (6 marks)
- d) Pulse Code Modulation (PCM) consists of three steps to digitize an analogue signal. Explain these steps (6 marks)

QUESTION FIVE (20 MARKS)

- a) Using an appropriate diagram of Audio production process, explain how it works (6 marks)
- b) Explain different ways of editing audio in the production process (4 marks)
- c) Explain the significance of performing chroma subsampling in image/video data compression (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)