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*(Knowledge for Development)*

**KIBABII UNIVERSITY**

**(KIBU)**

**UNIVERSITY EXAMINATIONS  
2017/2018 ACADEMIC YEAR**

**SPECIAL/SUPPLEMENTARY EXAMINATIONS  
YEAR FOUR SEMESTER TWO EXAMINATIONS**

**FOR THE DEGREE OF BACHELOR OF SCIENCE  
COMPUTER SCIENCE**

**COURSE CODE : CSC 456E**

**COURSE TITLE : DIGITAL AUDIO TECHNOLOGY**

**DATE: 11/10/2018**

**TIME: 3:00 P.M - 5:00 P.M**

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**INSTRUCTIONS TO CANDIDATES**

**ANSWER QUESTIONS ONE AND ANY OTHER TWO.**

**QUESTION ONE-COMPULSORY (30marks)**

- a) Differentiate between the following terms
  - i) Sound [1 mark]
  - ii) Acoustics [1 mark]
  - iii) Psychoacoustics [1 mark]
- b) Explain the two main advantages of digital processing of analogue signal [4 marks]
- c) Briefly describe the following analog to digital signal conversion steps
  - i) Filtering [2 marks]
  - ii) Sampling [2 marks]
  - iii) Quantization [2 marks]
  - iv) Coding [2 marks]
- d) Discuss the three parameters to be considered when digitizing an audio signal [6 marks]
- e) State any three applications of Digital Signal Processing, DSP [3 marks]
- f) Explain any two indicators of a good audio recording [3 marks]
- g) A 5-bit DAC produces an output voltage of 0.2V for a digital input of 00001. Determine the value of the output voltage for an input of 11111. [3 marks]

**QUESTION TWO (20marks)**

- a) Using a relevant block diagram, describe the operation of the digital ramp Analog-to-Digital converter [5 marks]
- b) Explain the functions of any three key components of the DSP [6 marks]
- c) Differentiate between lossy compression and lossless compression schemes [6 marks]
- d) Describe the working of the Chebyshev filters in digital signal processing [3 marks]

### QUESTION THREE (20mks)

- a) What is a compression technology [2 mark]
- b) Explain the three important trends that have contributed to the fact that nowadays compression is very crucial in digital data [6 marks]
- c) Outline the three stages of lossless compression [6 marks]
- d) Using a well labeled block diagram, explain the operation of the basic digital signal processing system [6 marks]

### QUESTION FOUR (20marks)

- a) Explain the following properties of microphones
  - i) Sensitivity [2 marks]
  - ii) Frequency response [2 marks]
  - iii) Directivity [2 marks]
- b) Outline the principle of operation of a loud speaker [4 marks]
- c) Illustrate the digital recording and reproduction process [6 marks]
- d) Explain the following digital transmission standards
  - i) AES/EBU [2 marks]
  - ii) ADAT light pipe [2 marks]

**QUESTION FIVE (20marks)**

- a) Explain the following acoustic considerations for a live performance
  - i) Potential acoustic gain [2 marks]
  - ii) Impulse response and reverberation time [2 marks]
  - iii) Resonance and room modes [2 marks]
- b) Describe the following audio coding formats
  - i) WAV [2 marks]
  - ii) AU [2 marks]
- c) Explain the three ways in which potential acoustic gain can be achieved increasing [6 marks]
- d) Explain the advantages of hard disk recording [4 marks]