TECHNICAL UNIVERSITY OF MOMBASA

INSTITUTE OF COMPUTING AND INFORMATICS

UNIVERSITY EXAMINATION FOR:

BSSC SEP 2015-J-FT / BBIT/SEP15/J-FT

EIT 4314: MULTIMEDIA SYSTEMS / MULTIMEDIA SYSTEMS AND APPLICATIONS

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: SEPTEMBER 2018

TIME: 2HOURS

DATE: Sep 2018

Instructions to Candidates

You should have the following for this examination
-Answer Booklet, examination pass and student ID
This paper consists of **FIVE** questions. Attemptquestion ONE (Compulsory) and any other TWO questions.
Do not write on the question paper.

Question ONE (Compulsory)

a) Give a definition of multimedia and a multimedia system. (2 Marks)

b) Distinguish between lossless and lossy compression and state two broad types of multimedia data that each is suited for. (6 Marks)

c) State four basic characteristics of a multimedia system. (4 Marks)

d) What is the difference between intraframe sampling and interframe sampling? (4 Marks)

e) What is MIDI, and What features of MIDI make it suitable for controlling software or hardware devices? (6 Marks)

f) What is the difference between reverberation and echo? (4 Marks)

g) Highlight two ways of creating digital images. (2 Marks)

Question Two

a) What are critical bands in relation to the human ear's perception of sound? (3 Marks)

b) Why is data compression necessary for multimedia activities? (2 Marks)

c) How does MPEG audio compression achieve critical band approximation? (3 Marks)

d) List three different perceptual characteristic of the human ear when hearing sound. Briefly explain how these arise in the human ear and how these methods are implemented in MPEG audio compression. (12 Marks)

Question Three

a) In a digital signal processing system. What are meant by block and sample processing? Give an example of an application of each type. (4 Marks)

b) What are the differences between analog signals and digital signals? (2 Marks)

c) A computer is to be used to add effects to analog audio signals. What two types of devices in general are needed? Describe their functionalities in the processing pipeline. (2 Marks)

(d) Audio signals are often sampled at different rates. CD quality audio is sampled at 44.1kHz rate while telephone quality audio sampled at 8kHz. What are the maximum frequencies in the input signal that can be fully recovered for these two sampling rates? Briefly describe the theory you use to obtain the results. (3 Marks)

e) Briefly describe five ways in which content can be formatted and delivered in a Multimedia Authoring System (5 Marks)

(f) What features of MIDI make it suitable for multimedia applications? Briefly justify your answer. What are the drawbacks of MIDI? (4 Marks)

Question Four

a) Show how you would encode the following token stream using zero length suppression and van length encoding ABCOOOAABOOOOOOOODEFABOOOOO. (5 Marks)

b) State Nyquist's sampling theorem. (1 Mark)

c) What are the implications of Nyquist's sampling theorem for multimedia data? (4 Marks)

d) For each of the following media types, graphics, images audio and video, briefly discuss how Nyquist's sampling affects the quality of the data and the form in which sampling effects manifest themselves in the actual data. (7 Marks)

e) What is the key difference between I-frames, P-frames and B-frames? (3 Marks)

Question five

a) 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 each data modality. (10 Marks)

b) 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). (6 Marks)

c) (b) What general considerations affect the selection of the sampling rate in multimedia data? (4Marks)