



FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA
SCHOOL OF INFORMATION AND COMMUNICATION TECHNOLOGY
DEPARTMENT OF INFORMATION AND MEDIA TECHNOLOGY

FIRST SEMESTER 2015/2016 EXAMINATION

COURSE CODE: CIT413
COURSE TITLE: Data Compression
CREDIT UNITS: 2
TIME ALLOWED: 2Hrs
COURSE LECTURER(S): Mrs. Faiza Babakano Jada
NUMBER OF QUESTIONS: 10 (Each question carries 6 marks)
NUMBER OF PAGES: 4 (INCLUDING THIS PAGE)

INSTRUCTIONS

- Answer all questions
- Do not use red pen
- Please use a clear handwriting
- This exam is closed book, closed notes, closed laptop and closed cell phone
- Please use non-programmable calculators only

1. a. What is data compression and why do we compress data?
b Explain briefly the meanings of *lossless* compression and *lossy* compression. For each type of compression, give an example of an application, explaining why it is appropriate.
2. Consider the three questions below:
 - a. Given four symbols A, B, C and D, the symbols occur with an equal probability. What is the entropy of the distribution?
 - b. Suppose they occur with probabilities 0.5, 0.25, 0.125 and 0.125 respectively. What is the entropy associated with the event (experiment)?
 - c. Suppose the probabilities are 1,0,0,0. What is the entropy?
3. Describe briefly how each of the two classes of lossless compression algorithms, namely the *adaptive* and the *non-adaptive*, works in its model. Illustrate each with an appropriate example.
4. Determine whether the following codes for {A, B, C, D} are *uniquely decodable*. Give your reasons for each case.
 - (a) {0, 10, 101, 0101}
 - (b) {000, 001, 010, 011}
 - (c) {00, 010, 011, 1}
 - (d) {0, 001, 10, 010}
5. Differentiate between dictionary based compression and statistical based compressions
6. Compare and contrast between arithmetic encoding and Huffman encoding.

7. Explain what we mean by order or context of a model with examples and mention the types of context models
8. Draw the Huffman tree and table for symbols shown in table below. Use the table to encode the word "nigerian".

e	a	g	n	r	i
1	1	1	2	1	2

9. Draw adaptive Huffman binary tree for "constitutions".
10. Encode and decode the "abbcaac" using arithmetic encoding given the distribution table below:

Probability Distribution

Symbol	Probability	Symbol Interval
a	2	[0.0 , 0.5)
b	1	[0.5 , 0.75)
c	1	[0.75 , 1.0)