

Date: 13/11/2017

Student Exam No: _____

GANPAT UNIVERSITY

M. TECH SEMESTER - III (COMPUTER ENGINEERING/INFORMATION TECHNOLOGY)

REGULAR EXAMINATION NOVEMBER – DECEMBER 2017

3CE304/3IT304: DATA COMPRESSION

Time: 3 hours

Total Marks: 60

- Instructions:** 1. Write each section in separate answer sheet.
2. Figure to the right indicates full marks.
3. Assume suitable data wherever necessary.

SECTION – I

- Q – 1 (a) Define data compression. Explain types of data compression. (4)
(b) What is entropy? Give the significance of entropy in information. Consider the alphabets A, B, C, D and E having following frequency: (4)

| Letter | A | B | C | D | E |
|-----------|----|----|----|---|---|
| Frequency | 24 | 12 | 10 | 8 | 8 |

Find out the entropy and total no of bits required to encode the string "ABCDE".

- (c) List out parameters to measure the performance of compression algorithm. Explain any one parameter. (2)

OR

- Q – 1 (a) Explain following terms with example: (6)
self information, prefix codes, uniquely decodable codes
(b) Explain modeling and coding. Explain how modeling and coding will help to reduce entropy (4)
for given data: 9,11,11,11,14,13,15,17,16,17,20,21

- Q – 2 (a) Consider the text string containing a set of characters and their frequency counts as follows: (5)
A:(15), B:(7), C:(6), D:(6) and E:(5). Find the entropy and average bits needed to encode the string using Shannon-Fano algorithm.
(b) Why adaptive Huffman code is more preferable than Huffman code? Write a procedure to encode a message using adaptive Huffman code. (5)

OR

- Q – 2 (a) Develop a Huffman code for the character sequence "zigzagzip" generated by a source. (5)
Draw the Huffman tree for the code. Compute the entropy of the source, average length of the Huffman code and its redundancy.
(b) Decode the given string 00000101000100000110001011001000100001010 using adaptive Huffman code. (5)

- Q – 3 (a) Consider 3 letter set $S = \{1, 2, 3\}$ with the given probability distribution: $P(1) = 0.5$, $P(2) = 0.3$ and $P(3) = 0.2$. Apply arithmetic coding to encode a sequence 1 3 3 2 and generate a tag. (5)
(b) Explain E1, E2 and E3 mapping for scaling the tag interval in arithmetic coding. (3)
(c) Discuss GOLOMB codes. (2)

SECTION – II

- Q – 4 (a)** Compare LZ77 with LZ78. Encode the sequence “AABABBBABAABABBBABBABB” using LZ78. (5)
(b) Discuss various JPEG modes. (5)

OR

- Q – 4 (a)** Differentiate static and adaptive dictionary techniques. Encode the sequence “abracadabra” using diagram coding of static dictionary technique. (5)
(b) Elaborate DCT, Quantization and entropy coding process in JPEG with their purpose. (5)

- Q – 5 (a)** Briefly explain Lloyd-Max Quantizer. (5)
(b) What is transform coding? List out different types of transform coding. Show the entire process of any one technique. (5)

OR

- Q – 5 (a)** Discuss various distortion measures for lossy compression schemes. (5)
(b) Explain uniform scalar quantization. (5)

- Q – 6 (a)** Explain LZW dictionary technique with its application. (5)
(b) List out different video coding standards. Explain any one video coding standard. (5)

END OF PAPER