Question Paper Code: 17809

M.E. DEGREE EXAMINATION. NOVEMBER/DECEMBER 2016.

Elective

Communication Systems

NC 7002 — MULTIMEDIA COMPRESSION TECHNIQUES

(Common to M.E. Communication and Networking/M.E. Electronics and Communication Engineering and M.E. Optical Communication)

(Regulations 2013)

Time: Three hours

Maximum: 100 marks

Answer ALL questions.

PART A — (10 x 2 = 20 marks)

1. A source image file of pixels 256 x 256 with 8 bit representation is compressed into a file with 16,384 bytes. What are the values for compression ratio and the compression factor?

2. What is need for using a colour look up table?

3. What static and adaptive dictionary?

4. Comment on how the inefficiency of Huffman codes is overcome in the case of arithmatic codes?

5. Define temporal masking.

6. What is the principle behind Formant vocoders?

7. What is the difference between sequential coding and progressive coding.

8. What is the basic idea behind subband coding?

9. What are the various steps involved in motion compensation based prediction.

10. What are the striking differences between MPEG-1 and MPEG-2 video compression standards.
11. (a) Discuss the various approaches for building mathematical models. Give the steps to test a code for unique decodability. 
(13)

Or

(b) Write short notes on a uniform quantizer and derive expressions for the following assuming the quantizer to be uniform 
(i) Mean square quantization error for uniform source. 
(ii) Mean square quantization error for non-uniform source. 
(6) (7)

12. (a) (i) Justify the optimality of Huffman codes. Obtain the upper and lower bound for the average code length of Huffman codes. 
(ii) Encode the following symbols using minimum variance Huffman code. 
(6) (7)

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
<th>A4</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROBABILITY</td>
<td>0.2</td>
<td>0.2</td>
<td>0.4</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Or

(b) Encode the following sequence using LZW algorithm. 'wabbacwabbac' (13)

13. (a) Explain in detail MPEG Layer-I and Layer-II coding audio coding scheme. 
(13)

Or

(b) Explain the principle behind the shorten compressor for waveform files. 
(13)

14. (a) Explain a typical EZW image coding technique. Apply EZW algorithm to the following seven level image coefficients. 
(13)

<table>
<thead>
<tr>
<th>26</th>
<th>6</th>
<th>13</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>-7</td>
<td>7</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>-4</td>
<td>4</td>
<td>-3</td>
</tr>
<tr>
<td>2</td>
<td>-2</td>
<td>-2</td>
<td>0</td>
</tr>
</tbody>
</table>

Or

(b) Write short notes on the following 
(i) Delta Modulation. 
(ii) DPCM. 
(6) (7)
15. (a) Explain in detail about the sequential search, 2D logarithmic search and hierarchical search algorithms used to search for motion vectors. (13)

Or

(b) Explain in detail the MPEG-I video compression standard. (13)

PART C — (1 x 15 = 15 marks)

16. (a) With the help of a suitable block diagram, derive the conditions for constructing a perfect reconstruction two channel filter bank. (15)

Or

(b) Decode the following sequence using LZW decoding

\[ 5 \ 2 \ 3 \ 3 \ 2 \ 1 \ 6 \ 8 \ 10 \ 12 \ 9 \ 11 \ 7 \ 16 \ 5 \ 44 \ 11 \ 21 \ 24 \] given the following initial dictionary:

<table>
<thead>
<tr>
<th>Index</th>
<th>Entry</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>G</td>
</tr>
<tr>
<td>2</td>
<td>a</td>
</tr>
<tr>
<td>3</td>
<td>b</td>
</tr>
<tr>
<td>4</td>
<td>o</td>
</tr>
<tr>
<td>5</td>
<td>w</td>
</tr>
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</table>

(15)