## M.TECH. INTELLIGENT AUTOMATION AND ROBOTICS

**MULTIMEDIA SYSTEMS** **Time: 3 hours** **Full Marks: 100**

Answer **any five** questions

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|---|---|---|---|
| 1. | a) | Explain the encoding and decoding process of Pixel-to- Pixel DPCM. | 12 |
| | b) | Write short note on 1D DPCM, 2D DPCM, 3D DPCM. | 8 |
| 2. | a) | Write short notes on the following topics : Special Redundancy and Temporal Redundancy. | 10 |
| | b) | Give a brief idea about Uniform Quantization. | 5 |
| | c) | Explain the μ law and A law | 5 |
| 3. | | Explain the sequential DCT based method for JPEG. | 20 |
| 4. | a) | What is linear transform? Describe the characteristics: Separability and Symmetricity. | 10 |
| | b) | Explain different types of masking. | 5 |
| | c) | Give an example of Huffman coding. | 5 |
| 5. | a) | Discuss the principle of basic block matching for motion estimation in video. | 4 |
| | b) | Explain the roles of cross-correlation and conjugate direction search in the process of block matching. | 6 |
| | c) | Explain how a multi-resolution strategy can improve the performance of a basic block matching algorithm. | 5 |
| | d) | Discuss the principle of predictive motion field estimation. | 5 |
| 6. | a) | Define optic flow. How an optic flow is mathematically represented? | 2+2 |
| | b) | Differentiate between a motion field and an optic flow field with proper examples. | 4 |
| | c) | Obtain an expression for the flow vectors following the Horn and Schunk approach. | 7 |
| | d) | Discuss a correlation based approach of determining optic flow. | 5 |
| 7. | a) | Discuss the basic principle of motion-compensated coding. State one advantage and one disadvantage of this method. | 5+2 |
| | b) | Explain the principle of PEL recursive techniques. | 3 |
| | c) | Describe a PEL recursive technique based on steepest descent approach. | 7 |
| | d) | Discuss a PEL recursive technique which uses Newton-Raphson method. | 3 |

8. a) Mathematically express image sampling for an image sequence. State the sampling theorem. 2+2
   b) Briefly explain how different types of redundancies can be exploited to achieve the goal of a video coding system. 3
   c) Describe the layered structure of the MPEG-1 video. 5
   d) Explain the importance and principle of detelecine processing. 1+3
   e) What is AVO in a MPEG-4 system? Briefly discuss the sprite coding aspect of MPEG-4. 2+2