

Hajee Mohammad Danesh Science & Technology University, Dinajpur
 Department of Computer Science and Engineering
 B.Sc. in Computer Science and Engineering
 Semester Final Examination 2016(Jul-Dec)
 Level 4 Semesters II Course Code: CSE 451 Credits: 3.0
 Course Title: Basic Multimedia System



Time: 3 Hours

Total Marks: 90

[N.B. The figure in the right margin indicates the marks for respective question and Split answer of any question is unacceptable]

Section-A

Answer any 3 (three) questions

1. a) Define **multimedia** and **hypermedia**. What are the key characteristics of a multimedia system? 2+2
- b) What are meant by the terms static media and dynamic media? Give examples of each type of media. 3
- c) Briefly describe the datastream characteristics for continuous media. 5
- d) What are the key distinctions between multimedia data and more conventional types of media? What key issues or problems does a multimedia system have to deal with when handling multimedia data? 2+1

2. a) What is data compression? Why is data compression, including file compression, highly desirable for multimedia activities? 1+2
- b) Show how you would use huffman coding to encode the following set of tokens: 6+2

BABACACADADABBCBABEBEDDABEEEEBB

 - i. How is this message transmitted when encoded?
 - ii. How many bits are needed to transfer this coded message? What is its entropy?
- c) What is the distinction between lossless and lossy compression? What broad types of multimedia data are each most suited to? 2+2

3. a) How does the human eye sense color? What characteristics of the human visual system can be exploited for the compression of color images and video? 2+2
- b) What is a color look-up table and how is it used to represent color? Give an advantage and a disadvantage of this representation with respect to true color (24-bit). 2+2+2
- c) What is the **CMYK** color model? Give an application in which this color model is mostly used and explain the reason. Given a color represented in **RGB** color space as $R = 0:2$, $G = 0:6$, $B = 0:3$, what is its representation in the **CMYK** color model? 2+1+2

4. a) What is the key difference among I-Frames, P-Frames and B-Frames? Why are I-frames inserted into the compressed output stream relatively frequently? 3+1
- b) Describe how **H.261** deals with temporal and spatial redundancies in video. 7
- c) What are the key differences between the JPEG and MPEG I-Frame compression pipelines? 4



Section-B

Answer any 3 (three) questions

1. a) Describe the three major observations that the effectiveness of the DCT transform coding method in JPEG relies on. 3
b) Briefly explain the main steps in jpeg image compression. 7
c) What is predictive coding? Explain JPEG-LS standard. 1+4
2. a) What is motion vector? Explain 2D logarithmic search for searching motion vector. 1+3
b) An H.261 video has the three color channels Y, Cr, Cb. Should MVs be computed for each channel and then transmitted? Justify your answer. If not, which channel should be used for motion compensation? 1+2+2
c) What is scalable coding? Draw the block diagram of how SNR scalability works in the MPEG-2 encoder and decoder. 1+5
3. a) What is chroma subsampling? Why is chroma subsampling meaningful? What is the benefit of doing chroma subsampling? 1+1+1
b) An MPEG-1 video has a frame sequence: **IBBPBBPBBPBBI**. Determine the size of GOP. Derive the transmission sequence of the frames. 2+2
c) What does *Nyquist's Sampling Theorem* state? Write a short notes on MIDI. 2+6
4
4. a) What is the Quality of Service (QoS)? Discuss about the important parameters needed to ensure QoS in internet and multimedia communication. 5
b) Why priority delivery is necessary for Multimedia communication? 2
c) Why are not B-frames used as reference frames for motion compensation? 2
d) What are the potential problems of the MPEG-1 implementation? How can they be improved in MPEG-4 coding standard? 2+4