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BITS, Pilani – Dubai, Academic City, Dubai.  
IV Year FIRST SEMESTER 2008-2009

Degree: B.E. (Hons.) Branch: C.S. / E.I.E.

TEST I Question Paper

Course No : EA C473 Course Title: Multimedia Computing

Date: 12, October, 2008 Sunday Time: 50 min. Total marks: 25

Data provided are complete. Closed Book.

This question paper has one page.

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Answer all Questions.

1. The following character string is to be transmitted using HUFFMAN CODING:

**IMAGEANDGRAPHICSVIDEOANDANIMATIONHUFFMANCODINGXACT**

- a) Construct the HUFFMAN Coding Tree for the letters present in the above string and determine the number of bits required to code each letter. [6 M]
- b) ENCODE (find the CODE) the following string: UNIXOS [1 M]
- c) Find the expected (average) number of bits per letter. [2 M]
2. A photograph of (9 X 12 inches) is scanning in 300 dpi resolution and 16 bit colour (per pixel). The image is then saved in a JPEG file with 1:18 compression ratio. It is then used on a web page. If a viewer connecting to internet uses a modem of transfer rate 512 Kilobits / sec., how long will it take to download the compressed image to his/her computer? [3 M]
3. What is TRACKING LIVE ACTION in Animation ? Give two examples. [3 marks]
4. Explain with Diagram the following Chroma Subsampling Scheme w.r.t. digital video:  
4:1:1 [3 M]
5. Distinguish between BITMAP and VECTOR Graphic. [3 M]
6. What are the steps in the display of of ROTATION ANIMATION. Assume that the two halves of the pixmap are  $image_0$  and  $image_1$ . ? [2.5 M]
7. What is Conditioning in Image Recognition? [1.5 M]

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**TEST II Question Paper**

**Course No : EA C473 Course Title: Multimedia Computing**

**Date: 23, Nov., 2008 Sunday Time: 50 min. Total marks: 20**

**Data provided are complete. OPEN Book.**

**Text Books/REFERENCE BOOK and Student's own handwritten class notes permitted.**

**This question paper has two pages.**

**Answer all Questions.**

**1. The following problem relates to the dimensions of a compressed image using JPEG format:**

You are given the following data:  $X_{max} = 1024$  pixels ; i.e. the maximum of all  $X_i$ .  
 $Y_{max} = 768$  pixels; i.e. the maximum of all  $Y_i$ .  
 $H_{max} = 4$  i.e. Maximum Horizontal sampling ratio.  
 $V_{max} = 4$  i.e. Maximum Vertical sampling ratio.

Now calculate  $(X_i, Y_i)$  for each of the following pairs of  $(H_i, V_i)$  :

$H_i$	$V_i$	$X_i$	$Y_i$
1	1		
4	1		
2	4		
1	2		
4	2		
1	4		
2	2		
4	4		
2	1		

Here,  $(H_i, V_i)$  refer to relative horizontal and vertical sampling ratio for each component . [3 marks]

**2. Distinguish between SNR Scalability and TEMPORAL Scalability in MPEG-2.**  
[2 marks]

**3. Explain the tasks performed by the four layers of the SYNCHRONIZATION REFERENCE MODEL w.r.t. the following application:**  
**COMPUTER-SUPPORTED CO-OPERATIVE WORK.**

[ 4 marks]

P.T.O.

4. Consider the transmission of a message comprising a string of characters. The probabilities of each character is given below:

$$p(A)=0.45 \quad p(C)=0.25 \quad p(F)=0.20 \quad p(T)=0.10$$

Using ARITHMETIC CODING,

- a) Encode the string FACT
- b) Decode 0.64102 [into a 4 letter string]

[6 marks]

5. Mention an example application for each of the following MPEG-4 AUDIO-VISUAL Scenes:

- a) 2D audio-visual scene involving the contents namely, *audio, video, still images* and *Animated text*.
- b) 3D audio-visual scene involving the contents namely, *audio, video* and *Still Images*.

[2 marks]

6. Find SSD [sum of squared differences] correlation for the following data pertaining to MPEG P-Frames:

MATCH WINDOW [macro-block]	SEARCH WINDOW
6 5 7 8	6 6 5 8
6 7 9 2	5 7 9 3
9 8 9 3	10 7 10 4
9 11 6 5	9 10 6 6

[1.5 M]

7a). In what layer of MPEG-1, you can distinguish between the *order of images in a data stream* and the *order during display* ? [0.5 mark]

b) Mention an example application for each of the *Multiple Communication Relations* [i.e. 1:1, n:1, 1:n, n:m], for establishing synchronization in a distributed environment. [1 mark]

QUIZ III

Course No : EAUC473 Course Title: Multimedia Computing

Date: 30, Nov., 2008 Sunday Time: 15 min. Total marks: 05

Weightage: 5% Venue : As per seating arrangement *Closed Book*.

This question paper has 2 pages. Data provided are complete.

Use Back Page for rough work only.

IDNO: \_\_\_\_\_

Name: \_\_\_\_\_

Write answers in the space provided in question paper. Answer all questions.

Note: \_\_\_\_\_ means one or more words to be filled within a line.

1. **Construct Table II** for dictionary-based LZW Compression Algorithm as shown below (algorithm need not be written; **only the table entries are to be filled for successive steps as necessary**).

Let the STRING TABLE (dictionary) initially contains only 3 characters with codes as shown in Table 1.

Table 1

Code	String
1	A
2	B
3	C

If the Input String is **BAACCCB** write the output codes for this input string.

TABLE II

s	c	output	code	string
			1	A
			2	B
			3	C

2 M

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QUIZ III

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Date: 30, Nov., 2008 Sunday Time: 15 min. Total marks: 05

Weightage: 5% Venue : As per seating arrangement ***Closed Book.***

This question paper has 2 pages. Data provided are complete.

Use Back Page for rough work only.

IDNO:

Name:

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2. Distinguish between MULTIMEDIA and HYPERMEDIA.

1 M

3. In MHEG Class Hierarchy, What is the function of BEHAVIOUR CLASS ? 1 M

4. What is the purpose of GIF Interlaces Mode ?

1 M

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QUIZ 1

Course No : EAUC473 Course Title: Multimedia Computing

Date: 23, Sep., 2008 Tuesday Time: 15 min. Total marks: 05

Weightage: 5% Venue : 276 *Closed Book.*

This question paper has 2 pages [use back of page for rough work only]

IDNO:

Name:

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Write answers in the space provided in question paper. Answer all questions.

Note: \_\_\_\_\_ means one or more words to be filled within a line.

1. What is a REPRESENTATION MEDIUM ? [0.5 M]

2. What is a Weakly Periodic Data Stream ? [0.5 M]

3. A multimedia presentation has 48 minutes of CD-Quality Digital Audio in .wav files.

Given the following parameters for CD-DA,

Sample Frequency : 44.1 KHz

Quantization : 16 bits

No of Channels = 2 (assume stereo)

What is the storage capacity required for these files in MB ?

[2 M]

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**QUIZ I**

Course No : EAUC473 Course Title: Multimedia Computing

Date: 23, Sep., 2008 Tuesday Time: 15 min. Total marks: 05

Weightage: 5% Venue : 276 **Closed Book.**

This question paper has 2 pages [use back of page for rough work only]  
IDNO: \_\_\_\_\_ Name: \_\_\_\_\_

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4. What is the function of *PACKET GATEWAY* in Telephony over the Internet?  
1 M

5. What is an Instrument Patch in MIDI? [0.5 M]

6. In Amplitude Envelop for MIDI, the Phase where time envelop will stay at peak level before starting the Decay is called \_\_\_\_\_.  
[0.5 M]

BITS, Pilani – Dubai, Dubai International Academic City  
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Comprehensive Examination Question Paper

Course No : EA UC473: Course Title: Multimedia Computing

Date: 29/12/08

Time: 10 am – 1 noon Total marks: 80

Weightage: 40% Data provided are complete. *Closed Book.*

**This question Paper has 2 pages.**

**Answer all questions.**

1. Draw the **diagram** (block schematic) for MULTI-PARTY (GROUP) VIDEO CONFERENCING w.r.t. speech & video interpersonal communications. [ 5 marks ]

2. Draw the **QUICKTIME Architecture Diagram** and explain the action of various subsystems. [5 marks]

3. What are the main research areas in design and implementation of multimedia user interface ? ( 4 marks)

4. Consider the transmission of a message comprising a string of characters. The probabilities of each character is given as input.

Write the basic steps (algorithm or pseudo-code or flowchart) for ARITHMETIC CODING to perform the following operations:

a) *Encode* a given *input string*. Assume that the string ends with “\$” i.e. terminator and assume the range for “\$” as [0.9,1.0).

b) *Decode* a given *input value* [into a string ending with “\$” ]. Assume that the *input value* is a positive real number between 0 and 1.

[5+5 marks]

5. The following **intensity values** in an image are to be transmitted using HUFFMAN CODING:

120	60	46	46	50	60	40	35
60	48	48	50	60	60	40	0
50	48	50	60	58	40	0	0
48	50	60	58	40	0	0	0
50	55	58	40	0	0	0	0
55	58	45	0	0	0	0	0
35	45	0	0	0	0	0	0
35	0	0	0	0	0	0	0

*Construct* the HUFFMAN Coding Tree step by step for the above intensity values present in the above image and *determine* the number of bits required to code each intensity value. [10 M]

P.T.O.



6. Explain the need for Eight-to-Fourteen Modulation in compact disk digital audio. [4 marks]
7. Discuss the AMPLITUDE ENVELOP (amplitude vs time) w.r.t. MIDI. [5 marks]
8. Discuss in brief the methods for Controlling Animation. [ 7 marks]
9. Draw the diagram corresponding to the VIDEO STREAM in MPEG-1. [5 marks]
10. Mention any two VECTOR GRAPHIC TOOLS. [2 marks]
11. Explain MCUs (minimum coded units) in JPEG standard involving 4 components. ( 7 marks)
12. Give an example for a heterogeneous multimedia query. [2 marks]
13. What are the main aspects that you will consider in designing an effective multimedia user interface ? [4 marks]
14. Illustrate Time Diagram of an interactive multimedia presentation with an example. [4 marks]
15. Distinguish between INTRA-OBJECT SYNCHRONIZATION & INTER-OBJECT SYNCHRONIZATION. Give an example in each category. [4 marks]
16. Define *termination-codes* and *makeup-codes* in digitized documents. [ 2 marks]