

Comprehensive Examination Question Paper

BITS, Pilani – Dubai, Academic City, Dubai.

IV Year I Semester 2010-2011

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

Course No : EA C473 Course Title: Multimedia Computing

Date: 27/12/2010 Monday Time: 3 hours Total marks: 80

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

This question paper has 2 pages.

Answer **all** Questions.

1. Write a brief outline of the RUNLENGTH ENCODING ALGORITHM. [2 M]
2. Mention any two practical applications relating to CONTENT BASED INTERACTIVITY in MPEG-4 standard. [2 M]
3. Mention the names of the layers in the MULTIMEDIA SYNCHRONIZATION REFERENCE MODEL. [2 M]
4. What are the requirements to consider in the design of a QUERY LANGUAGE to handle multimedia content? [2 M]
5. What are the main requirements for a HEAD MOUNTED DISPLAY? [2 M]
6. Write a brief technical note, highlighting the main functions of the following MHEG Classes:
Action, Link, Script, Descriptor and Macro. [5 M]
7. Draw the **diagram** for SPEECH-ONLY interpersonal communications using public and private switched telephone networks. [5 M]
8. Distinguish between BITMAP and VECTOR GRAPHIC. [4 M]
9. Explain in brief the following w.r.t. Musical Instruments Digital Interface:
 - a) OMNI ON / OMNI OFF
 - b) MONOPHONY / POLYPHONY
 - c) INSTRUMENT PATCH [6 M]

P.T.O.

10. Explain, with a diagram, the steps for VIDEO PROCESSING of Bidirectional Frames (B-frames) in MPEG-1 standard. [10 M]

11. Write an algorithm (pseudo code) to implement the HUFFMAN CODING Data Compression technique. [10 M]

12. Explain the following w.r.t. ANIMATION:

- a) Controlling Animation.
- b) Display of Animation. [6+4 M]

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

$$p(\mathbf{G})=0.40 \quad p(\mathbf{I}) = 0.30 \quad p(\mathbf{N}) = 0.20 \quad p(\mathbf{S}) = 0.10$$

Using ARITHMETIC CODING,

- a) Encode the string **SING**
- b) Decode 0.2301 [into a 4 letter string]

[5+5 M]

14. Draw the **QUICKTIME Architecture** Diagram and explain the function of each of its subsystems / components.

[5+5 M]

TEST II Question Paper
BITS, Pilani – Dubai, Academic City, Dubai.
IV Year FIRST SEMESTER 2010-2011

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

Course No : EA C473 Course Title: Multimedia Computing

Date: 28, Nov., 2010 Sunday Time: 50 min. Total marks: 20

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

Text Books and Class notes permitted.

This question paper has 2 pages.

Answer all Questions.

1. Compare the SCALABILITY MODES of MPEG-2 in terms of their main functions. [3 M]

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

$$p(\mathbf{D})=0.40 \quad p(\mathbf{F})=0.30 \quad p(\mathbf{I})=0.20 \quad p(\mathbf{N})=0.10$$

Using ARITHMETIC CODING,

- a) **Encode** the string FIND
- b) **Decode** 0.4502 [into a 4 letter string]

[6 M]

3. **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	R
3	T

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

TABLE II

s	c	output	code	string
			1	A
			2	R
			3	T
.....

P.T.O

[6 M]

4. The display order for a MPEG 1 frame sequence is given below:
IBBPBBPBBI IBBPBBPBBI IBBPBBPBBI IBBPBBPBBI IBBPBBPBBI IBBPBBPBBI

Find the Decoding Order.

[3 M]

5. What can you infer from the **level of detection graph** in LIP SYNCHRONIZATION?

[2 M]

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TEST I Question Paper

BITS, Pilani – Dubai, Academic City, Dubai.
IV Year FIRST SEMESTER 2010-2011

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

Course No : EA C473 Course Title: Multimedia Computing

Date: 17, October, 2010 Sunday Time: 50 min. Total marks: 25

Data provided are complete. **Closed Book.**

This question paper has one page.

Answer all Questions.

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

MULTIMEDIAOSQUICKTIMEARCHITECTUREVIDEOANDANIMATION

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]

2. Explain with Diagram the following Chroma Subsampling Scheme w.r.t. digital video:

4:2:2

[3 M]

3. Find the **AUDIO DATA RATE** in KB/sec. for **CD-DA** for the following input data:

- 16 BIT Linear Quantization (per sample)
- 2 channels
- 44100 samples / second for each channel.
-

What will be the **TIME** required to transmit a **10 minutes** portion of the above audio data using a Transmission Channel of bit rate **10 Mbps** (megabits per second) ?

[3 M]

4. Explain DITHERING w.r.t. Images.

[3 M]

5. Draw the schematic (diagram) for CSCW (computer supported co-operative working involving text & image).

[4 M]

6. Distinguish between *Strongly periodic data streams* and *Weakly periodic data streams*.

[2 M]

7. Explain in brief the methods of Controlling Animation.

[4 M]

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IV Year First Semester 2010-2011

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QUIZ II

SET A

Course No : EAC473 Course Title: Multimedia Computing

Date: 09, Dec. 2010, Thursday Time: 20 min. Total marks: 07

Weightage: 7% Venue: As per seating arrangement **Closed Book.**

This question paper has 2 pages [use backside for rough work]

IDNO:

Name:

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

1. Mention the main factors that you will consider regarding AESTHETICS in a multimedia user interface. [1 M]

2. Mention the names of at least two libraries or toolkits for multimedia user interface design. [1 M]

3. Define the regularity of the minimal and maximal distances in Eight-to-Fourteen Modulation. [2 M]

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QUIZ II

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IDNO:

Name:

4. What are the different types of Menus in a multimedia interface? [1 M]

5. What is the difference between ICON & MICON? [1 M]

6. Distinguish between CLV (constant linear velocity) and CAV (constant angular velocity) w.r.t. CD drives. [1 M]

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IV Year First Semester 2010-2011

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QUIZ I SET A

Course No : EAC473 Course Title: Multimedia Computing

Date: 08, Nov., 2010 Monday Time: 20 min. Total marks: 08

Weightage: 8% Venue : As per seating arrangement **Closed Book.**

This question paper has 2 pages [use backside for rough work]

IDNO:

Name:

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

1. Draw the MHEG (multimedia and hypermedia information coding expert group) Class Hierarchy diagram mentioning the names of the individual elements. [2 M]

2. What is *Attribute Relation* in a Multimedia Database System? Mention an example. 1 M

3. In a Multimedia Database System, define a *Heterogeneous Multimedia Query*. [1 M]

QUIZ I SET A

Course No : EAC473 Course Title: Multimedia Computing

Date: 08, Nov., 2010 Monday Time: 20 min. Total marks: 08

Weightage: 8% Venue : As per seating arrangement **Closed Book.**

This question paper has 2 pages [use backside for rough work]

IDNO:

Name:

4. 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 Verical 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
2	1		
4	1		
2	4		
1	2		

Here, (H_i, V_i) refer to relative horizontal and vertical sampling ratio for each component . [2 marks]

5. Write the equation corresponding to 2D Forward DCT (discrete cosine transformation) in JPEG standard along with meaning of relevant co-efficients/parameters. [2 marks]