

BITS, Pilani – Dubai, Academic City, Dubai.

IV Year First Semester 2009-2010

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

Comprehensive Examination Question Paper

Course No : EA C473 Course Title: Multimedia Computing

Date: 28/12/2009 Monday Time: 3 hours Total marks: 80

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

**This question paper has 2 pages.**

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**Part A**

Answer all Questions.

10 \* 2 = 20 Marks

1. What is PRESENTATION & REPRESENTATION MEDIUM ?
2. What is an INBETWEEN PROCESS in ANIMATION?
3. What are the main requirements for a HEAD MOUNTED DISPLAY?
4. Draw the diagram showing the GRANULARITY of a motion picture sequence [uncompressed video].
5. What is the basic principle in GIF Interlaced Mode ?
6. What are the functions of MACRO CLASS in MHEG CLASS HIERARCHY?
7. Mention the names of the basic steps in the JPEG compression process.
8. What is VIEW-SPECIFIC and SIMULTANEOUS DATA ACCESS in an MDBMS?
9. What are the general Design Issues in an Multimedia User Interface?
10. What is a Minimum Coded Unit in JPEG standard? How many maximum data units can be present in a minimum coded unit?

**Part B**

Answer all Questions.

4\*5= 20 marks

11. Distinguish between MIDI and DIGITAL AUDIO.
12. A photograph of (6 X 8 inches) is scanning in 400 dpi resolution and 8 bits/pixel color. The image is then saved in a JPEG file with 1:20 compression ratio. It is then used on a web page. If a viewer connecting to internet uses a modem of transfer rate 256 Kilobits / sec., how long will it take to download the compressed image to his/her computer? [ 3 marks ]
  - b) What is Symbolic Image Data Transmission? [2 marks]
13. Explain the basic functions of **B-FRAME** in MPEG-1 VIDEO with a diagram.
14. Explain in brief the following w.r.t. Compact Disk Digital Audio (CD-DA):
  - a) Eight-to-Fourteen Modulation
  - b) Areas: *Lead-In, Program and Lead-Out.* [2.5+2.5 marks]

**P.T.O.**

**Part C**                      **Answer all Questions.**

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

$$p(A)=0.30 \quad p(R) = 0.20 \quad p(M) = 0.15 \quad p(S) = 0.20 \quad p(T)=0.15$$

Using **ARITHMETIC CODING**,

- a) **Encode** the string ARTS
- b) **Decode** 0.2052 [into a 4 letter string] [ 10 M]

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

**THEUNIXMULTIUSEROSORIGINATEDINSIXTYNINEATUCBERKLEY**

*Construct* the HUFFMAN Coding Tree for the letters present in the above string and *determine* the number of bits required to code each letter. [10 marks]

17. **Tabulate**, in the form of a Table, the **Interface Abstraction & Tasks** performed in each of the 4 layers in Synchronization Reference Model (as shown below). [10 marks]

Layer	Interface Abstraction	Tasks
....	...	....

18. Draw the **QUICKTIME Architecture** Diagram and explain its various components and their functions. [10 marks]

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**TEST II Question Paper**

Course No : EA C473 Course Title: Multimedia Computing

Date: 13, Dec., 2009 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. A separate figure is attached for question 5.

Answer all Questions.

1. What are the main advantages of Scalable Compression in MPEG-2? 2 marks

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

$p(E)=0.35$      $p(N) = 0.20$      $p(O) = 0.30$      $p(P) = 0.15$

Using ARITHMETIC CODING,

a) Encode the string OPEN

b) Decode 0.5510 [into a 4 letter string]

[6 marks]

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 2 characters with codes as shown in Table 1.

Table 1

Code	String
1	A
2	B

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

**TABLE II**

s	c	output	code	string
			1	A
			2	B
...	...	...	...	...
...	...	...	...	...

(Draw this table with as many rows, as necessary)

6 M

P.T.O.

4. Find SSD & SAD [sum of squared differences & sum of absolute differences] and correlation for the following data pertaining to MPEG P-Frames:

MATCH WINDOW [macro-block]				SEARCH WINDOW				
16	15	17	18		16	16	15	8
16	17	19	12		5	17	9	3
18	19	13	15		10	17	10	14
19	11	16	25		9	10	16	16

[2 + 1 M]

5. Digitized Document: Find the code words for the following input scanned line of pels (in the given order).

80 White run length, 90 Black run length, 220 White run length, 180 Black run length (refer Fig. 3.11 as given in question paper).

[ 2 M ]

6. Distinguish between 4on2 and 4onIP in MPEG-4 standard. [1 M]

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**Figure 3.11 ITU-T Group 3 and 4 facsimile conversion codes: (a) termination-codes, (b) make-up codes.**

**(a)**

White run-length	Code-word	Black run-length	Code-word
0	00110101	0	0000110111
1	000111	1	010
2	0111	2	11
3	1000	3	10
4	1011	4	011
5	1100	5	0011
6	1110	6	0010
7	1111	7	00011
8	10011	8	000101
9	10100	9	000100
10	00111	10	0000100
11	01000	11	0000101
12	001000	12	0000111
13	000011	13	00000100
14	110100	14	00000111
15	110101	15	000011000
16	101010	16	0000010111
17	101011	17	0000011000
18	0100111	18	0000001000
19	0001100	19	00001100111
20	0001000	20	00001101000
21	0010111	21	00001101100
22	0000011	22	00000110111
23	0000100	23	00000101000
24	0101000	24	00000010111
25	0101011	25	00000011000
26	0010011	26	000011001010
27	0100100	27	000011001011
28	0011000	28	000011001100
29	00000010	29	000011001101
30	00000011	30	000001101000
31	00011010	31	000001101001
32	00011011	32	000001101010
33	0010010	33	000001101011
34	00010011	34	000011010010
35	00010100	35	000011010011
36	00010101	36	000011010100
37	00010110	37	000011010101
38	00010111	38	000011010110
39	00101000	39	000011010111
40	00101001	40	000001101100
41	00101011	41	000001101101
42	00101011	42	000011011010
43	00101100	43	000011011011
44	00101101	44	000001010100
45	00000100	45	000001010101
46	00000101	46	000001010110
47	00001010	47	000001010111
48	00001011	48	000001100100
49	01010010	49	000001100101
50	01010011	50	000001010010
51	01010100	51	000001010011
52	01010101	52	000000100100
53	00100100	53	000000110111
54	00100101	54	000000111000
55	01011000	55	000000100111

**(a) cont.**

White run-length	Code-word	Black run-length	Code-word
56	01011001	56	000000101000
57	01011010	57	000001011000
58	01011011	58	000001011001
59	01001010	59	000000101011
60	01001011	60	000000101100
61	00110010	61	000001011010
62	00110011	62	000001100110
63	00110100	63	000001100111

**(b)**

White run-length	Code-word	Black run-length	Code-word
64	11011	64	0000001111
128	10010	128	000011001000
192	010111	192	000011001001
256	0110111	256	000001011011
320	00110110	320	000000110011
384	00110111	384	000000110100
448	01100100	448	000000110101
512	01100101	512	0000001101100
576	01101000	576	0000001101101
640	01100111	640	0000001001010
704	011001100	704	0000001001011
768	011001101	768	0000001001100
832	011010010	832	0000001001101
896	011010011	896	0000001110010
960	011010100	960	0000001110011
1024	011010101	1024	0000001110100
1088	011010110	1088	0000001110101
1152	011010111	1152	0000001110110
1216	011011000	1216	0000001110111
1280	011011001	1280	0000001010010
1344	011011010	1344	0000001010011
1408	011011011	1408	0000001010100
1472	010011000	1472	0000001010101
1536	010011001	1536	0000001011010
1600	010011010	1600	0000001011011
1664	011000	1664	0000001100100
1728	010011011	1728	0000001100101
1792	00000001000	1792	00000001000
1856	00000001100	1856	00000001100
1920	00000001101	1920	00000001101
1984	000000010010	1984	000000010010
2048	000000010011	2048	000000010011
2112	000000010100	2112	000000010100
2176	000000010101	2176	000000010101
2240	000000010110	2240	000000010110
2304	000000010111	2304	000000010111
2368	000000011100	2368	000000011100
2432	000000011101	2432	000000011101
2496	000000011110	2496	000000011110
2560	000000011111	2560	000000011111
EOL	00000000001	EOL	00000000001

on paper - pg ③

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IV Year FIRST SEMESTER 2009-2010

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TEST I Question Paper

Course No : EA C473 Course Title: Multimedia Computing

Date: 25, October, 2009 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:

**TOPPLACEMULTIMEDIAINITSPPROPERCONTEXTMULTIMEDIASYSTEM**

*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. A photograph of (9 X 12 inches) is scanning in 400 dpi resolution and **16 bit colour** (per pixel). The image is then saved in a JPEG file with **1:20** compression ratio. It is then used on a web page. If a viewer connecting to internet uses a modem of transfer rate 1024 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 M]

4. Explain the following types of video signals:

a) COMPONENT VIDEO b) COMPOSITE VIDEO c) S-VIDEO [2+1+1 M]

5. What are the contents of FRAME HEADER in JPEG ? [2 M]

6. Draw the schematic (block diagram) for JPEG DECODER. [ 5 M]

7. What is GROUPING in Image Recognition? [2 M]

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QUIZ II

Course No : EAC473 Course Title: Multimedia Computing

Date: 16, Nov., 2009 Monday 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:**

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

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

1 M

2. In a Multimedia Database System, define a *Heterogeneous Multimedia Query*. Give an example. [0.5+1 M]

3. What is the function of ACTION, LINK and SCRIPT Classes in MHEG class hierarchy? 1.5 M

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Date: 16, Nov., 2009 Monday 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:**

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4. What is a HYPERMEDIA system ? 1 M

5. What is *Content Relations* in Synchronization ? 1 M

6. What are the tasks performed in *Specification Layer* in synchronization reference model? 1 M



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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. What is *Component Relation* in a Multimedia Database System ? Mention an example.

1 M

2. What is the function of CONTENT, INTERACTION and COMPOSITE Classes in MHEG class hierarchy?

1.5 M

3. What is *Spatial Relations* in Synchronization ? 1 M

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

**IDNO:**

**Name:**

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4. What is a HYPERMEDIA system ? 1 M

5. What are the tasks performed in MEDIA *Layer* in synchronization reference model?  
1 M

6. In a Multimedia Database System, define a *Heterogeneous Multimedia Query*. Give an example.  
[0.5+1 M]

Set 1

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QUIZ I

Course No : EAC473 Course Title: Multimedia Computing

Date: 12, Oct., 2009 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:**

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

1. A multimedia presentation has 90 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 ?

[1 M]

2. What is Asynchronous Transmission Mode w.r.t. multimedia systems ? [1 M]

3. What is an Irregular Data Stream ?

[1 M]

4. State the Nyquist Sampling Theorem for lossless digitization.

[1 M]

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QUIZ I

Course No : EAC473 Course Title: Multimedia Computing

Date: 12, Oct., 2009 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:**

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5. Give an example for System Real-Time Message in MIDI. [1 M]

6. Give an example for Channel Voice Message in MIDI. [1 M]

7. What is the function of a *Voice-Mail Server* in *Speech-Only* Interpersonal communications ? [1 M]

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