

BITS, Pilani – Dubai Campus, Knowledge Village, Dubai.

IV Year Second Semester 2004-2005

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

Comprehensive Examination Question Paper

Course No : EA UC473 Course Title: Multimedia Computing

Date: 02, June., 2005 Thursday Time: 10 a.m.- 1 Noon Total marks: 60

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

Part A

Answer all Questions.

10 \* 2 = 20 Marks

1. What is Representation Medium? Give an example.
2. A photograph of (6 X 8 inches) is scanning in 300 dpi resolution and 8 bit colour. 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 52 Kilobits / sec., how long will it take to download the compressed image to his/her computer?
3. Given the bandwidth of a speech signal is from 50 Hz through to 10 KHz, derive the BIT RATE [in Kbps] that is generated by the digitization procedure assuming the Nyquist sampling rate is used with 16 bits per sample for the speech signal.
4. Mention the names of Research Areas in SPEECH ANALYSIS.
5. What is FLICKER EFFECT? How can you reduce it?
6. Distinguish between Constant Linear Velocity (CLV) and Constant Angular velocity w.r.t. CD-ROM.
7. Give an example each for a) Hypertext System b) Hypermedia System.
8. In Multimedia User Interface Design, what aspects/factors does AESTHETICS consider?
9. In Windows Multimedia Extensions (WME), what is the function of multimedia file I/O service?
10. Give an example each for an IMAGE QUERY and AUDIO QUERY in a sample multimedia scenario.

Part B. Answer all questions.

4 \* 5 = 20 marks

11. Explain in brief the CLASS HIERARCHY of MHEG objects, with a diagram. [5 M]
12. Explain in brief, CD-ROM Extended Architecture's FORM 1 and FORM 2 Block Layouts (in mode 2) with diagrams. [5 M]

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13. Explain the LEVEL of DETECTION of Synchronization Errors and LEVEL of ANNOYANCE of audio/visual skew in LIP SYNCHRONIZATION. [5 M]

14. Explain the following steps w.r.t. IMAGE RECOGNITION with diagrams:

- a) Labelling 2.5 M
- b) Grouping 2.5 M

Part C. Answer all questions.

2 \* 10 = 20 marks

15. Explain the following w.r.t. multimedia applications: 5+5 M

- a) Elements of Computer Supported Cooperative Work (CSCW).
- b) Features of an IMAGE EDITOR with a diagram.

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

$$p(A)=0.30 \quad p(M)=0.20 \quad p(N)=0.25 \quad p(I)=0.25$$

Using ARITHMETIC CODING,

- a) Encode the string MAIN
- b) Decode 0.6534 [assume 4 letter word]

[10 M]

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Comprehensive Examination Marking / Answering Scheme

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Part A Answer all Questions. 10 \* 2 = 20 Marks

1. Representation Medium: internal computer rep. Of information. ASCII, JPEG, PCM.

2.  $6 * 300 * 8 * 300 * 8$

-----  
 $20 * 52 * 1024 :$

32.45 sec. [1+1 for the steps and final answer]

3.  $20K * 16 = 320$  kbps.

4. Verification, Identification, Recognition, Understanding.

5. Periodic fluctuation of brightness perception, through a slow motion.

Display Refresh buffer eliminates / reduces flicker effect. [1+1]

6. difference w.r.t. rotational speed, data transfer rate to be specified.

7. Appropriate example in Hypertext/Hypermedia System 1+1 mark.

8. colour combination, character sets, resolution, form of the window.

9. buffered/unbuffered file I/O. supports RIFF files. 1+1

10. Appropriate Image, Audio query 1+1

Part B. Answer all questions.

4 \* 5 = 20 marks

11. Explain in brief the CLASS HIERARCHY of MHEG objects, with a diagram. Diagram and description [3+2 M]

12. Explain in brief, CD-ROM Extended Architecture's **FORM 1** and **FORM 2 Block Layouts (in mode 2)** with diagrams. [5 M]

Diagram + description (1.5+1) + (1.5+1)

13. Explain the LEVEL of DETECTION of Synchronization Errors and LEVEL of ANNOYANCE of audio/visual skew in LIP SYNCHRONIZATION. [5 M]

Level of Detection : Diagram + desc 1+1.5

Level of Annoyance: Diagram+desc 1+1.5

14. Explain the following steps w.r.t. IMAGE RECOGNITION with diagrams:

c) Labelling Diagram+desc 1.5+1 = 2.5 M

d) Grouping Diagram+desc 1.5+1 = 2.5 M

course file

Part C. Answer **all** questions.

2 \* 10 = 20 marks

15. Explain the following w.r.t. multimedia applications:

- a) Elements of Computer Supported Cooperative Work (CSCW). 5M
- b) Features of an IMAGE EDITOR with a diagram. 2.5+2.5 M

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

$$p(A)=0.30 \quad p(M) = 0.20 \quad p(N) = 0.25 \quad p(I) = 0.25$$

Using ARITHMETIC CODING,

- c) Encode the string MAIN STEPS: 1+1+1+1+1
- d) Decode 0.6534 [assume 4 letter word] Steps: 1+1+1+1+1

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BITS, Pilani – Dubai Campus, Knowledge Village, Dubai.

IV Year SECOND Semester 2004-2005

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

TEST II Question Paper

Course No : EA UC473 Course Title: Multimedia Computing

Date: 01, May, 2005 Sunday Time: 9.30.- 10.20 am. Total marks: 20

Data provided are complete. OPEN *Book*. There are 2 pages in this gn paper.

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

MATCH WINDOW [macroblock]	SEARCH WINDOW
6 8 10	6 10 9
4 5 7	2 6 8
10 7 3	9 8 2

[3M]

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

You are given the following data:  $X_{max} = 512$  pixels ; i.e. the maximum of all  $X_i$ .  
 $Y_{max} = 256$  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  $(H_i, V_i)$ :

$H_i$	$V_i$	$X_i$	$Y_i$
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]

3. It has been planned to design a **multimedia user interface** for the following application:

“ An Internet Based LEARNING SYSTEM for the course EAUC473 MULTIMEDIA COMPUTING”.

For the **above application**, explain the **design criteria** for designing an user friendly interface. [5 marks]

4. Where are the following Optical Storage Media Formats used?

- a) CD-ROM MODE 1    b) CD-ROM MODE 2  
c) CD-ROM/XA FORM 1    d) CD-ROM/XA FORM 2

[2 marks]

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BITS, Pilani – Dubai Campus, Knowledge Village, Dubai.

IV Year First Semester 2004-2005

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

TEST II Marking / Answering Scheme

Course No : EA UC473 Course Title: Multimedia Computing

Date: 01, May, 2005 Sunday Time: 9.30.- 10.20 am. Total marks: 20

Data provided are complete. OPEN *Book*.

1. SSD, SAD correct steps of calculations: 2 + 1 M

2.

X i	Y I
256	64
512	64
256	256
128	128

8\*0.25=2 marks.

3. 10 criteria w.r.t application 10\*0.5=5 marks

4. Optical Storage Media : typical applications and usage 4\*0.5=2 marks.

5. Correct Application 2 marks Explanation w.r.t. application 2 marks.

6. a) **Encode the quantized sequence using DPCM.** 2.5 marks.

22, 2, 0, 4, 0, 0, -3, 1, 0, 0, -5, -2, 1, 0, 2, 2, 0, 0, -1, 1, -4, -4 -6, 0, -2, 3, -5, 3, 0, 3, 3, 4

b) **How many bits do you need to encode the difference?** 1 mark.

The numbers in this set range from -6 to 22 which means that 5 bits per number is needed for encoding.

c) **How many bits do you need to transmit the entire sequence ?** 0.5 mark.

5\*32 = 160.

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BITS, Pilani – Dubai Campus, Knowledge Village, Dubai.

IV Year Second Semester 2004-2005

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

TEST I Marking / Answering Scheme

Course No : EA UC473 Course Title: Multimedia Computing

Date: 20/3/05 Sunday Time: 9.30-10.20am Total marks: 20

Data provided are complete: *Closed Book*.

1. Explain GRANULARITY of an uncompressed VIDEO SEQUENCE (motion picture) with a diagram.  
Diagram: 1 mark. Description about film, clip, frame, block, pixel 2marks.
2. Explain the following modes w.r.t. MIDI (music instrument digital interface):  
a) MODE 1: OMNI ON / POLY midi device monitors all midi channels and responds to channel messages, device can play several notes at a time.  
b) MODE 2: OMNI OFF / MONO midi device responds only to channel messages sent on the channel(s) the device is set to receive. Device plays 1 note at a time.  
4\*0.5=2m
3. Explain the Image Technique: DITHERING, with suitable diagrams for 2 x 2 dither patterns.  
[2.5+2.5m]
4. Find the AUDIO DATA RATE in KB/sec. for CD-DA for the following input data:
  - 16 BIT Linear Quantization
  - 2 channels
  - 44100 samples / second for each channel.What will be the TIME required to transmit a 2 minutes portion of the above audio data using a Transmission Channel of bit rate 2 Mbps?  
176.4 KB/sec or 172.3 KB / sec with steps 0.5+0.5  
53.83 sec. with steps 0.5 + 0.5
5. Mention the names of the techniques for Controlling Animation. [4\*0.5m]  
any 4: full explicit control, procedural control, constraint-based systems, tracking live action, kinematics/dynamics.
6. Arithmetic Coding: Initial Step, successive steps, correctly encoded value: 1+3+1 M
7. Huffman Coding: C K C V [0.25\*4=1m]

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B. K. K. V.

BITS, Pilani – Dubai Campus, Knowledge Village, Dubai.  
IV Year Second Semester 2004-2005

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

TEST I Question Paper

Course No : EA UC473 Course Title: Multimedia Computing

Date: 20, Mar., 2005 Sunday Time: 9.30 am.- 10.20 am Total marks: 20

Data provided are complete. *Closed Book.*

1. Explain GRANULARITY of an uncompressed VIDEO SEQUENCE (motion picture) with a diagram. [3]
2. Explain the following modes w.r.t. MIDI (music instrument digital interface):
  - a) MODE 1: OMNI ON / POLY
  - b) MODE 2: OMNI OFF / MONO [1+1]
3. Explain the Image Technique: DITHERING, with suitable diagrams for 2 x 2 dither patterns. [2.5+2.5]
4. a) Find the AUDIO DATA RATE in KB/sec. for CD-DA for the following input data:
  - 16 BIT Linear Quantization
  - 2 channels
  - 44100 samples / second for each channel.b) What will be the TIME required to transmit a 3 minutes portion of the above audio data using a Transmission Channel of bit rate 2 Mbps? [1+1]
5. Mention the names of the techniques for Controlling Animation. [2 marks]
6. Consider the transmission of a message comprising a string of characters. The probabilities of each character is given below:  
 $p(M)=0.40$      $p(A) = 0.20$      $p(N) = 0.25$      $p(I) = 0.15$

Using ARITHMETIC CODING, Encode the string : MAIN [5 marks]

7. The following Questions (15 to 20) refer to Huffman Coding using the data given in the table shown below:

Letter	Frequency	CODE	Bits
C	32	1110	4
D	42	101	3
E	120	0	1
F	24	11111	5
K	7	111101	6
L	42	110	3
V	37	100	3
Z	2	111100	6

DECODE the following bit string and get the corresponding input word.

1110111101110100

[1 mark]