Reg. No. :

Question Paper Code : 41065

B.E. /B. Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Fifth Semester

Biomedical Engineering

OTL 552 – DIGITAL AUDIO ENGINEERING

(Common to: Computer Science and Engineering/ Computer and Communication Engineering/ Electronics and Communication Engineering/ Material Science and Engineering/ Medical Electronics/ Information Technology)

(Regulations 2017)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Discuss the impact of aliasing in sampling of audio signal.

2. Why the standard audio sample rate is 44.1 kHz?

3. An audio signal of sampling frequency fs=8KHz is recorded encoded with 16 bit and recorded in MONO. To store 100ms signal in PCM format how much memory is required.

4. How jitter can affect the audio recording? And how the effects of jitter in digital audio recording can be avoided?

5. An implementation of a cyclic encoder for the generator polynomial $X^3 + X^2 + 1$ using shift registers.

6. Draw the block diagram of perception based audio coders.

7. What is use of Universal Disc Format (UDF) bridge?

8. What is an optical disk in digital audio engineering?

9. List the features of MPEG–4.

10. What is a sound card? List the latest sound cards.

PART B — (5 × 13 = 65 marks)

11. (a) (i) What is sampling rate and bit-depth.? How it is related to sound quality. (6)

 (ii) Derive the signal to error ratio of a quantizer. (7)

Or

 (b) (i) Elaborate the need of Dither in the effects of quantization error and explain the various methods of adding Dither to the audio signal. (6)

 (ii) Show the effects of dither of varying amplitudes in the input/output transfer characteristic. (7)

12. (a) (i) Implement a successive approximation register (SAR) A/D for achieving good-quality audio digitization. (6)

 (ii) Implement a linear PCM record section with its principal elements. (7)

Or

 (b) (i) Compare the performance of simple codes and group codes used for channel coding. (5)

 (ii) Illustrate transmitter and receiver of the Eureka 147/DAB system with neat block diagrams. (8)

13. (a) (i) Design the CRCC encoding and decoding algorithms and syndrome calculation with message sequence 1001. (8)

 (ii) What is the need of interleaving in error correction codes? Discuss about the cross-interleaving. (5)

Or

 (b) (i) Compare loosy with lossess compression standards. (6)

 (ii) Illustrate the MPEG I standard bit stream format with its structure. (7)

14. (a) With neat figure explain the erasable optical medias of audio storage.

Or

(b) Explain the digital audio editing with random access media and recording media.

15. (a) (i) Discuss the physical and software characteristics of MIDI. (6)

(ii) Discuss the MIDI application software. (7)

Or

(b) (i) Explain the data frame composition used in the HD Audio specification, defining how streams and channels are transferred on a link. (8)

(ii) Brief the file format of MP3. (5)

PART C — (1 × 15 = 15 marks)

16. (a) Design a test pattern and compliance bitstreams for verifying the performance of an implementation of an MPEG audio tool. Outline the scope of MPEG audio standards.

Or

(b) Design and implement a efficient digital representation for transmission and storage of voice signal using sub-band coding.

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