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Question Paper Code: 36401

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Sixth Semester

Electronics and Communication Engineering

01UEC601 - DIGITAL SIGNAL PROCESSING

(Regulation 2013)

Duration: 1.15 hrs

Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

- How many stages of decimations are required in the case of a 64 point radix 2 DIT FFT algorithm?
(a) 8 (b) 6 (c) 4 (d) 3
- How many additions are required to compute N point DFT using radix 2 FFT?
(a) $\frac{N}{2}\log_2 N$ (b) $N \log_2 N$ (c) $\log_2 N$ (d) $N/2$
- What is the order of the normalized low pass Butterworth filter used to design an analog band pass filter with -3.0103dB upper and lower cut-off frequency of 50Hz and 20KHz and a stop band attenuation 20dB at 20Hz and 45KHz?
(a) 2 (b) 3 (c) 4 (d) 5
- If N_B and N_C are the orders of the Butterworth and Chebyshev filters respectively to meet the same frequency specifications, then which of the following relation is true?
(a) $N_C = N_B$ (b) $N_C < N_B$ (c) $N_C > N_B$ (d) Cannot be determined
- Which region of the frequency specification has to be optimized to reduce side lobes of the FIR filter?
(a) Stop band (b) Pass band
(c) Transition band (d) None of these
- Substitution of values for names whose values are constant, is done in
(a) Is a Recursive (b) Use less memory
(c) Is Unstable (d) Has linear phase response

7. Sign magnitude representation of $-7/8$ is
 (a) 1.001 (b) 1.111 (c) 1.100 (d) 0.111
8. Which of the following is not a quantization error occurring in digital systems?
 (a) Input quantization error (b) Product quantization error
 (c) Coefficient quantization error (d) Output quantization error
9. Which of the following is the disadvantage of sampling rate conversion by converting the signal into analog signal?
 (a) Signal distortion
 (b) Quantization effects
 (c) New sampling rate can be arbitrarily selected
 (d) Both (a) and (b)
10. In subband coding, the input signal is first split into number of non-overlapping frequency by
 (a) Low pass filter (b) High pass filter
 (c) Band pass filter (d) Band stop filter

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. Compute the Eight point DFT of the sequence
 $x(n) = \{0.5, 0.5, 0.5, 0.5, 0, 0, 0, 0\}$
 using the in-place radix-2 DIT FFT algorithm. (8)
12. The specifications of the desired low pass filter is
 $0.7 \leq |H(e^{j\omega})| \leq 1; \quad 0 \leq \omega \leq \pi/2$
 $|H(e^{j\omega})| \leq 0.2 \quad ; \quad 3\pi/4 \leq \omega \leq \pi$
 Design a digital butter worth filter using bilinear transformation. Assume $T=1$ sec. (8)

13. Design a Low Pass Filter with 11 coefficients for the following Specifications: pass frequency edge is $0.25kHz$ and sampling frequency is $1kHz$ using hanning window. (8)
14. A digital system is characterized by the difference equation $y(n) = 0.95y(n-1) + x(n)$ with $x(n) = 0.875$, $n=0$. Assume $b=4$ bits. Find out limit cycle of oscillation and estimate the dead band of the system. (8)
15. Discuss the sub band coding of speech signal with a suitable example. (8)