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Question Paper Code: 56421

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

Sixth Semester

Electrical and Electronics Engineering

15UEC621 – SIGNAL PROCESSING

(Common to Electronics and Instrumentation Engineering)

(Regulation 2015)

Duration: 1.15 hrs

Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

- For a system to be causal CO1- R
(a) $h(n) \neq 0$ for $n < 0$ (b) $h(n) = 0$ for $n < 0$ (c) $h(n) = 0$ for $n \geq 0$ (d) $\sum_{k=-\infty}^{\infty} |h(n)| < \infty$
- Sampling theorem: CO1- R
(a) $f_m < f_s$ (b) $f_s > f_m$ (c) $f_s \geq 2f_m$ (d) $f_s = 2f_m$
- For what kind of signals one sided z-transform is unique? CO2- R
(a) All signals (b) Anti-causal signal (c) Causal signal (d) None of the above
- The z transform is a, CO2- R
(a) finite series (b) infinite power series
(c) geometric series (d) both a and c
- The direct evaluation DFT requires ----- complex multiplications CO3- R
(a) $N(N-1)$ (b) N^2 (c) $N(N+1)$ (d) $\frac{N(N-1)}{2}$
- For a decimation-in-time FFT algorithm, which of the following is true? CO3- R
(a) Both input and output are in order (b) Both input and output are shuffled
(c) Input is shuffled and output is in order (d) Input is in order and output is shuffled
- Which of the following is not suitable either as low pass filter or a High CO4- R
pass filter
(a) $h(n)$ symmetric and 'M' odd (b) $h(n)$ symmetric and 'M' even
(c) $h(n)$ anti-symmetric and 'M' odd (d) $h(n)$ anti-symmetric and 'M' even

8. In which window sequence, the width of the main-lobe can be adjusted by varying the length N of the window? CO4- R
 (a) Hamming (b) Hanning (c) Bartlett (d) Kaiser
9. Size of the ALU of TMS320C54X DSP processor CO5- R
 (a) 8-bit (b) 16-bit (c) 40-bit (d) 32-bit
10. The addressing mode which makes use of in-direction pointers is CO5- R
 (a) Indirect addressing mode (b) 5 Index addressing mode and 7
 (c) Relative addressing mode (d) Offset addressing mode

PART – B (3 x 8 = 24 Marks)

(Answer any three of the following questions)

11. For each of the following systems, determine whether the system is time variant or time invariant CO1- App (8)
 (i) $y(n) = x(2n)$
 (ii) $y(n) = e^{x(n)}$
 (iii) $y(n) = x(n) + n x(n+1)$
 (iv) $y(n) = \cos [x(n)]$
12. State and prove the convolution theorem of Z – transform. CO2- App (8)
13. Compute DFT using DIT-FFT algorithm CO3- App (8)

$$X(k) = \{0.5, 0.5, 0.5, 0.5, 1, 1, -1, -1\}$$
14. Design a second order digital low pass Butterworth filter with a cut-off frequency 3.4 KHz at a sampling rate of 8 KHz using bilinear transformation. CO4- App (8)
15. Explain various addressing modes of a digital signal processor. CO5- U (8)