



Dayananda Sagar College of Engineering

Shavige Malleshwara Hills, Kumaraswamy Layout, Banashankari, Bangalore-560078, Karnataka

Tel : +91 80 26662226 26661104 Extn : 2731 Fax : +90 80 2666 0789

Web - <http://www.dayanandasagar.edu> Email : hod-ece@dayanandasagar.edu

(An Autonomous Institute Affiliated to VTU, Approved by AICTE & ISO 9001:2008 Certified)

(Accredited by National Assessment & Accreditation Council (NAAC) with 'A' grade)



Department of Electronics & Communication Engg.

Continuous Internal Evaluation – I

Course Name : Digital Signal Processing

Course Code : 18EC5DCDSP

Semester : 5

Max Marks : 50 M

Date : 05.10.2020

Day : Monday

Timings : 01.00 to 2.30pm

Duration : 1½ Hrs.

		Marks	CO & Levels
Q1	(a) If $X(k)$ and C_k are the coefficients of DFT and Fourier series respectively, then the relation between them is given as i) $X(k) = \frac{1}{N} C_k$ ii) $X(k) = N + C_k$ iii) $C_k = \frac{1}{N} X(k)$ iv) $C_k = X(k)$	1	
	(b) Given W_N is a twiddle factor matrix with any element a_{ij} , choose the correct statement (a) $a_{ij} = a_{ji}$ (b) $a_{ij} = -a_{ji}$ (c) $a_{1j} = a_{i1}$ (d) $a_{ij} = a_{ji}^*$ i) (a) and (b) are correct ii) (a) and (c) are correct iii) (a) and (d) are correct iv) (c) and (d) are correct	1	
	(c) Which of the following is/are incorrect statement/s? i) $W_N^a = W_N^{a+N}$ ii) $W_N^{-a} = (W_N^a)^*$ iii) $W_N^{-a} = -(W_N^a)^*$ iv) both ii) and iii)	1	
	(d) The term $N\delta(k)$ is the DFT of _____ i) $N\delta(n)$ ii) $u(n)$ iii) $Nu(n)$ iv) $\delta(n)$	1	
	(e) For a real valued 4 point sequence $x(n)$, the 4 point DFT is $X(k)$. If $X(1) = 1 - 2j$ then $X(7) =$ _____ i) $1-2j$ ii) $1+2j$ iii) $2+j$ iv) $2-j$	1	
	(f) Which of the following is an example for odd sequence? i) $x(n) = [0, 5, -6, -6, 5]$ ii) $x(n) = [0, 5, 6, 6, 5]$ iii) $x(n) = [0, 5, 6, -6, -5]$ iv) $x(n) = [0, -5, 6, 6, -5]$	1	
	(g) If $[W]_N$ is a twiddle factor matrix then its inverse is given by i) $N [W]_N$ ii) $\frac{1}{N} [W]_N^*$ iii) $N [W]_N^*$ iv) $\frac{1}{N} [W]_N$	1	
	(h) For a real sequence $x(n)$, the N (even number) point DFT is denoted as $X(k)$. Which of the following is a wrong statement? i) $X(0)$ is real ii) $X\left(\frac{N}{2}\right)$ is real iii) $X(N-1)$ is always real iv) $X(N-k) = X(k)^*$	1	
	(i) DFT of a real and even sequence is i) purely real ii) purely imaginary iii) combination of real and imaginary iv) None of these	1	
	(j) Which of the following is a wrong statement as concerned to DFT/FFT? i) $W_N^{2kr} = W_{N/2}^{kr}$ ii) $-W_N^k = W_N^{k+\frac{N}{2}}$ iii) $X(k) = X(k+N)$ iv) $W_N^{2kr} = -W_{N/2}^{kr}$	1	
Q2	Let $x(n)$ be a finite length sequence with $X(k) = [0, 1+j, 1, 1-j]$ using the relation between DFT and DTFS and DFT properties find DTFS coefficients of the following sequences. i) $x_1(n) = e^{\frac{j\pi n}{2}} x(n)$ ii) $x_2(n) = x((n-1))_4$ iii) $x_3(n) = (0,0,1,0) (*)_N x(n)$, where $(*)_N$ indicates circular convolution.	10	CO 1,2/L4
Q3	(a) Compute 4 point DFT of the sequence $x(n) = [1,3,5,7]$ using DIT-FFT approach.	5	CO1/L3
	(b) Find the total number of multiplications and additions required for 2048 point DFT using conventional DFT and FFT approach. Also find the speed improvement factor.	5	CO1/L3
Q4	(a) Find 5 point circular convolution of the following sequences using concentric circle graphical method: $x_1(n) = [1,2,-1,4,3]$ and $x_2(n) = [2,0,-1,4]$	6	CO1/L3
	(b) A 4 point sequence $x(n) = [1,2,3,4]$ has DFT $X(k)$ for $0 \leq k \leq 3$. Find the sequence which has DFT $X((K-1))_4$ without performing DFT and IDFT.	4	CO1/L4

OR

Q5	(a)	Show that multiplication of two DFTs in frequency domain corresponds to circular convolution in time domain.	4	CO1/L3
	(b)	Compute the 5 point DFT of the sequence $x(n) = [1, 3, 5, 7, 9]$. Also plot magnitude spectrum.	6	CO1/L3
Q6		Consider a sequence $x(n) = [1, 1, 0, 3, -2, -4, 6, 5]$ with DFT $X(k)$. Evaluate the following functions without evaluating the DFT.	10	CO1/L4
		i) $X(0)$ ii) $X(4)$ iii) $\sum_{k=0}^7 e^{-j\frac{2\pi k}{4}} X(k)$ iv) $\sum_{k=0}^7 X(k) ^2$ v) $\sum_{k=0}^7 X(k)$		
		OR		
Q7		Given the impulse response of a system as $h(n) = [1, -1, 2]$, find the output of the system $y(n)$ for an input $x(n) = [1, 3]$ using DFT-IDFT formula method.	10	CO2/L4

Staff : STM/KSG/CU/KP