

Roll No: -----



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, May 2018

Program: B.Tech.,ASE-A
 Subject (Course): Digital signal processing
 Course Code : ELEG 311
 No. of page/s:2

Semester –VI
 Max. Marks: 100
 Duration : 3 Hrs

SECTION A

S. No.		Marks	CO
Q 1	Let X(K) be a 12-point DFT of a length 12 real sequence x(n).The first 7 samples of X(K) are given by X(0)=8,X(1)=-1+j2,X(2)=2+j3, X(3)=1j4,X(4)=2+j2,X(5)=3+j,X(6)=-1-3j Determine the remaining samples of X(K).	5	CO1
Q2	Compare direct form I and direct form II realization of IIR systems.	5	CO4
Q3	State and prove the initial value theorem and convolution time with respect to Z-transform.	5	CO2
Q4	Explain with the block diagram the basic Elements of Digital Signal processing	5	CO1
SECTION B All questions are compulsory and carry equal marks. Note: Attempt any one question from Qno 8 & Qno 9			
Q5	(a) find $x(\infty)$, If $X(z) = \frac{2z+3}{(z+1)(z+3)(z-1)}$ (b) Define odd signal? And find the even and odd components of the signal $x(n) = \sin^2 n + 2\sin n + 2\sin^2 n \cos n$.	5+5	CO1
Q6	Determine H(Z) using impulse invariant technique for the analog system function $H(S) = \frac{1}{(S+1)(S^2+S+2)}$ for a sampling frequency of 4 samples per second	10	CO4
Q7	(a) Compare the computation complexities of DFT & FFT.	5+5	C03

	(b) For each impulse response determine the system is i) stable ii) causal i) $h(n) = \sin(\pi n / 2)$ ii) $h(n) = \delta(n) + \sin \pi n$ iii) $h(n) = 2^n u(-n)$.		
Q8	(a) Compare analog and digital filters. State the advantages of digital filters over analog filters. (b) Prove that for causal sequences, the ROC is the exterior of a circle of radius r.	5+5	C02
Q9	(a) What are two properties of twiddle factor W_N that are exploited in Fast Fourier transform algorithm? Prove them (b) Distinguish between recursive realization and non-recursive realization	6+4	C03
SECTION-C 40 Marks			
Attempt any two questions and each carry equal marks.			
Q10	An 8-point sequence is given by $x(n) = \{0, 1, 2, 3, 4, 5, 6, 7\}$ compute 8-point FFT by using a) Radix 2 DIT algorithm b) Radix 2 DIF algorithm Also sketch the magnitude and phase spectrum	10+10	C03
Q11	Obtain the i) Direct form I ii) Direct form II iii) cascade iii) parallel form realizations for the following $Y(n) = -0.1y(n-1) + 0.2y(n-2) + 3x(n) + 3.6x(n-1) + 0.6x(n-2)$	20	C04
Q12	(a) Compute the response of the system $y(n) = 0.7y(n-1) - 0.12y(n-2) + x(n-1) + x(n-2)$ to input $x(n) = nu(n)$. Is the system stable? (b) A causal LTI system is defined by the difference equation $2y(n) - y(n-2) = x(n-1) + 3x(n-2) + 2x(n-3)$ find the frequency response, magnitude response and phase response	10+10	C02

Roll No: -----