

Thapar University, Patiala

Electronics and Communication Engineering Department

End Semester Test

Max. Marks: 100 (35%)

Date: May 19, 2017

Instructor: Dr. Kulbir Singh

UEC 404 (Signals and Systems)

Time Allotted: 3 Hrs.

B.E. 2nd year Mechatronics (MTX)

Instructions: You are expected to answer all (Five) questions. Organize your work, in a reasonably neat and coherent way. Mysterious or unsupported answers will not receive full credit. Calculator without graphing mode and alphanumeric memory is permitted. Assume any missing data/information, appropriately.

Q4.	a)	Demonstrate, using $x_1(n) = \{2, 1, 2, 1\}$ and $x_2(n) = \{1, 2, 3, 4\}$, that the circular convolution can be calculated using DFT.	10
	b)	An 8-point sequence is given by $x(n) = \{2, 2, 2, 2, 1, 1, 1, 1\}$. Compute 8-point DFT of $x(n)$ by using radix-2 DIT-FFT method with the help of well labeled sketch.	10
Q5.	a)	What is the physical significance of random signals? Discuss the power spectral density of a random process and its relationship to auto-correlation function. Also calculate the power of a wide sense stationary random process.	7
	b)	A random experiment consists of drawing two cards from a deck in succession (without replacing the first card drawn). Assign a value to the probability of obtaining two red aces in two draws.	6
	c)	A sinusoidal generator output voltage is $A \cos \omega t$. This output is sampled randomly as shown in figure given below. The sampled output is an RV x , which can take on any value in the range $(-A, A)$. Determine the mean value and the mean square value of the sampled output x .	7

