



**B.Tech - Odd Sem : End Semester Exam**  
**Academic Year:2020-2021**  
**18EM3201 - SIGNAL PROCESSING**  
**Set No: 3**

<b>Time:</b>		<b>Max.Marks: 100</b>					
S.NO	Answer All Questions	Choice	Options	Marks	CO	CO BTL	COI BTL
1.	Sketch the resultant signal $y(n)$ with proper illustrations and steps: $y(n) = Ax(n)$ , where $A=2$ and $x(n)=[2,1,2]$	choice Q-2		10Marks	CO1	2	2
2.	Discuss the periodic signal and aperiodic signals with proper illustrations			10Marks	CO1	2	1
3.	Discuss the signal quantization technique with proper illustrations	choice Q-4		15Marks	CO1	2	2
4.	Calculate the energy and power of the given signal: $x(n) = u(n) - u(n - 6)$ .			15Marks	CO1	2	1
5.	If the DFT $\{x(n)\} = X(k) = \{-4j, 2, 0, j2\}$ , find DFT of $x(-n)$ using properties of discrete Fourier transform	choice Q-6		10Marks	CO2	4	2
6.	Discuss in detail the Matrix-form of DFT			10Marks	CO2	4	1
7.	A 10 kHz sinusoidal signal is sampled at 80 kHz and 64 samples are collected and used to compute the 64-point DFT of this signal. At what DFT indices $k = 0, 1, \dots, 63$ ; peaks in the DFT can be observed ?	choice Q-8		15Marks	CO2	4	3
8.	Using the FFT algorithm, compute the 8-point DFT of the following 8-point signal: $x = \text{Transpose}([4, -3, 2, 0, -1, -2, 3, 1])$ 15M			15Marks	CO2	4	4
9.	Discuss in detail along with the mathematical equation of the transfer function of a first-order lowpass filter along with digital cut off frequency	choice Q-10		10Marks	CO3	4	2
10.	Design a peaking digital filter operating at a rate of 10 kHz that has a peak at 1.75 kHz and 3-dB width of 500 Hz. Then, redesign it such that 500 Hz represents its 10-dB width.			10Marks	CO3	4	1
11.	Discuss in brief along with analytical expression for frequency map and bilateral transformation of the bandstop IIR filter	choice Q-12		15Marks	CO3	4	3
12.	(b) Determine the length-11, rectangularly windowed impulse response that approximates (a) an ideal lowpass filter of cutoff frequency $c = \pi/4$ , (b) the ideal differentiator filter, and (c) the ideal Hilbert transformer filter			15Marks	CO3	4	4
13.	Sketch the canonical realization of the transfer function for Coupled form sine/cosine generator	choice Q-14		10Marks	CO4	4	2
14.	List out the trade-off between sound quality and data rate for high fidelity music and telephone quality speech			10Marks	CO4	4	2
15.	Describe the discrete Cosine Transform used for image compression.	choice Q-16		15Marks	CO4	4	4
16.	Explain the operation of the neural network architecture with the help of a neat sketch			15Marks	CO4	4	3

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