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B. Tech EE (Semester –7th)
DIGITAL SIGNAL PROCESSING
Subject Code: BELED1-714
Paper ID: [18111545]

Time: 03 Hours **Maximum Marks: 60**

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A **(2 marks each)**

Q1. Attempt the following:

a. What are band pass and band stop filters.
b. Determine whether the system is linear or non-linear $y(n) = x(n^2)$.
c. Determine whether signal is periodic or non-periodic also determine its fundamental period
$x(n) = \cos\frac{30n\pi}{105}$.
d. Determine the Z transform of unit step sequence.
e. What is time shifting property of DFT?
f. List the errors arise due to the quantization of filter coefficients.
g. What are the basic elements used to construct the realization structures of discrete time system?
h. Give the advantages of digital filter over analog filter.
i. What is frequency wrapping in bilinear transformation?
j. Explain the significance of sampling theorem.

Section – B **(5 marks each)**

Q2. How does a Wiener filter work?

Q3. Compute circular convolution x1(n) * x2(n) for N = 5
if $x1(n) = \delta(n) + \delta(n-1) - \delta(n-2) - \delta(n-3)$ and $x2(n) = \delta(n) - \delta(n-2) - \delta(n-4)$.

Q4. Discuss the FIR filter design by window method.

Q5. Compute the linear convolution of the given sequences:
x1(n) = [1,3,2,2]
x2(n) = [2,4,3,2,2]

Q6. Determine Z-transform of the signal x(n) = (-1)n2-nu(n)

Section – C **(10 marks each)**

Q7. Describe various features of DSP processors, also describe the architecture of a ADSP-21xx family processor/s.

Q8. a) Find the 4-point DFT of the sequence $x(n) = \cos\frac{n\pi}{4}$

b) Derive the relation between DFT and Z transform.

Q9. Explain the different types of structures for the realization of FIR filter.