

Registration No:

--	--	--	--	--	--	--	--	--	--

Total Number of Pages: 02

B.Tech
PCEC4304

6th Semester Back Examination : 2018-19
DIGITAL SIGNAL PROCESSING
BRANCH: AEIE, CSE, ECE, EEE, EIE, ETC, IEE, MECH
Time: 3 Hours
Max Marks: 70
Q.CODE: F384

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

- Q1** Answer the following questions: (2 x 10)
- a) Define causal and non-causal signals.
 - b) Define energy and power signal.
 - c) State properties of ROC
 - d) What is zero padding? What are its uses?
 - e) How many multiplications and additions are required to compute 16 point DFT using radix-2 FFT?
 - f) Draw the basic butterfly diagram of DIF algorithm
 - g) Distinguish between linear convolution and circular convolution of two sequences.
 - h) Distinguish between FIR filters and IIR filters.
 - i) What is Gibb's phenomenon?
 - j) How one can design digital filters from analog filters?
- Q2**
- a) Show that the following systems are nonlinear and time invariant. (5)
 $y(n) - x(n)y(n-1) = x(n)$
 - b) Find the Z-transform of $x(n) = (1/8)^n u(n)$ and its ROC. (5)
- Q3**
- a) The impulse response of a LTI system is $h(n) = \{1, 2, 1, -1\}$. Determine (7)
the response of the system to the input signal $x(n) = \{1, 2, 3, 1\}$.
 - b) Perform the circular convolution of the following two sequences (3)
 $x_1 = \{1, 1, 2, 1\}$ and $x_2(n) = \{1, 2, 3, 4\}$.
- Q4**
- a) Find the DFT of a sequence $x(n) = \{1, 1, 2, 2\}$ (7)
 - b) What are the advantages of FFT over DFT. (3)

Q5 a) Obtain the direct form I, direct form II and Cascade form realization of the following system functions. **(7)**

$$Y(n) = 0.1 y(n-1) + 0.2 y(n-2) + 3x(n) + 3.6 x(n-1) + 0.6 x(n-2).$$

b) By using differentiation property, determine the Z-transform of the following signal $x(n) = n b^n u(n)$. **(3)**

Q6 (a) What is section convolution? Explain overlap add method with diagram and visual explanation. **(5)**

(b) The system function of the analog filter is given as $H_a(s) = \frac{(S + 0.1)}{(S + 0.1)^2 + 9}$. Obtain the system function of the IIR digital filter by using Impulse Invariance Method. **(5)**

Q7 Find the DFT of the sequence $x[n] = \{1, 2, 3, 4, 5, 6, 7, 8\}$ using DIF FFT. **(10)**

Q8 Write short answer on any TWO: (5 x 2)

a) Adaptive Filter

b) DIT FFT

c) LMS Algorithm

d) DCT is an orthogonal transform