

B.TECH SEM – IV (2007 COURSE) (COMPUTER ENGG.) :

SUMMER - 2018

SUBJECT: DIGITAL SIGNAL PROCESSING TECHNOLOGY

Day : **Saturday**
Date : **09/06/2018**

S-2018-2613

Time : **10.00 AM TO 01.00 PM**
Max. Marks: 80

N. B. :

- 1) **Q.No.1** and **Q.No.5** are **COMPULSORY**. Out of the remaining questions attempt **ANY TWO** questions from each section.
- 2) Answers to both the sections should be written in **SEPARATE** answer books.
- 3) Use of non-programmable **CALCULATOR** is allowed.
- 4) Figures to the right indicate **FULL** marks.
- 5) Assume suitable data if necessary.

SECTION – I

- Q.1** (a) Determine if the following systems are linear, causal, and time variant. [06]
i) $y(n) = x(n) + 4x(n-1)$
ii) $y(n) = x(2n)$
(b) Explain any two properties of DFT. [04]
(c) Define region of convergence (ROC) and explain the properties of ROC. [04]
- Q.2** (a) Explain different types of signals with suitable example. [07]
(b) Explain the following concepts: [06]
i) Sampling
ii) Quantization
iii) Aliasing
iv) Encoding
- Q.3** (a) Determine DFT of sequence $x(n) = \{1, 2, 0, 1\}$ and check validity of answer by calculating its IDFT. [06]
(b) State and prove linearity and periodicity property of DFT. [07]
- Q.4** (a) Determine Inverse Z-transform of [07]
$$x(z) = \frac{1 - \frac{1}{2}z^{-1}}{1 - \frac{1}{2}z^{-2}}$$

(b) Using differentiation property obtain ZT of unit step sequence [06]

SECTION – II

- Q.5** (a) Explain Infinite Impulse Response(IIR) along with IIR filter design using impulse variance. [06]
(b) Describe functions of data address generators and program sequencer in ADSP 2100 processor. [04]
(c) Explain Echo cancellation using DSP. [04]
- Q.6** (a) Describe butterworth filter approximation. Draw its characteristics. [07]
(b) Transfer function of analog filter is [06]
$$H(s) = \frac{1}{(s+2)(s+3)} \quad T_s = 0.1 \text{ sec}$$

Design IIR filter using BLT method.
- Q.7** (a) Explain architecture of ADSP 21XX processor with neat diagram. [07]
(b) Explain DSP processor with its features. [06]
- Q.8** (a) Describe speech recognition and speech synthesis system. [06]
(b) Explain application of DSP in image processing [07]

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