

B.TECH SEM – IV (2007 COURSE) (COMPUTER ENGG.) :
WINTER - 2017

SUBJECT: DIGITAL SIGNAL PROCESSING TECHNOLOGY

Day: **Thursday**
Date: **23/11/2017**

W-2017-2408

Time: **02.30 PM TO 05.30 PM**
Max. Marks 80

N.B.:

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

SECTION-I

- Q.1** a) Analyze the following system for linearity, causality and time invariance (05)
 $y(x) = ax(n) + 5x(n-1)$
- b) Determine Z Transform and ROC of a signal (05)
 $x(n) = (n+1)u(n)$
- c) Define auto correlation and cross correlation. (04)
- Q.2** a) Describe analog to digital conversion process with neat block diagram. (07)
- b) Determine linear convolution using equation method. (06)
 $x(n) = \{2,1,2,1\}$ and $h(n) = \{1,0,1\}$.
- Q.3** a) Define twiddle factor. State and prove properties of twiddle factor used in FFT (07) algorithm.
- b) Find 4 point DFT of signal $x(n) = \{1,2,3,1\}$. Verify your answer using IDFT. (06)
- Q.4** a) Obtain inverse Z transformer (I Z T) for following causal sequence (07)
$$X(Z) = \frac{1 - \frac{1}{2}Z^{-1}}{1 - \frac{1}{4}Z^{-2}}$$
- b) State and prove time reversal property of Z Transform. Obtain Z Transform of (06)
a signal $x(n) = u(-n)$

P. T. O.

SECTION-II

- Q.5** a) Explain Gibb's phenomenon. (05)
- b) Compare Harvard architecture with modified Harvard architecture. (05)
- c) Describe application of DSP in vibration analysis. (04)
- Q.6** a) Draw and explain characteristics of Butterworth filter. (07)
- b) Transfer function of analog filter is (06)
- $$H(s) = \frac{1}{(s+2)(s+3)} \quad \text{with } T_s = 1 \text{ sec}$$
- Design digital IIR filter using Bilinear transformation method.
- Q.7** a) Draw and explain architecture of ADSP21XX processor. (07)
- b) Explain the function of MAC and Barrel shifter. (06)
- Q.8** a) Describe speech recognition system with neat block diagram. (07)
- b) Explain how echo cancellation is carried out in telephone system. (06)

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