

**B.Tech. SEM -VI ( Computer) 2014 Course (CBCS) : WINTER -  
2017**

**SUBJECT : DIGITAL SIGNAL PROCESSING**

Day : **Wednesday**  
Date : **22/11/2017**

**W-2017-2195**

Time : **10.00 AM TO 01.00 PM**  
Max. Marks : 60

**N.B.**

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.

**Q.1** Describe the process of Analog to Digital Conversion. State Sampling theorem and Aliasing effect. (10)

**OR**

Analyze the following system for causality, linearity, time variance and stability.

- i)  $y(n) = x(n) + nx(n+1)$
- ii)  $y(n) = nx^2(n)$

**Q.2** What is twiddle factor? Calculate four point DFT of  $x(n) = \{1, 2, 2, 1\}$ . (10)  
Verify your answer using IDFT.

**OR**

Draw signal flow graph for Radix-2 DIT FFT algorithm for 8 point DFT. Determine total number of twiddle factors required to compute the same.

**Q.3** What is significance of ROC? Find ROC of stable system whose transfer function is (10)

$$H(z) = \frac{1 - 2z^{-1}}{1 + 3z^{-1} + 9z^{-2}}$$

**OR**

State and prove any four properties of z transform.  
Find z transform of  $x(n) = a^n u(n-1)$ .

**Q.4** Consider LTI system with system function (10)

$$H(z) = \frac{1 + 1/5 z^{-1}}{(1 - 0.5z^{-1} + 1/3 z^{-2})(1 + 0.25z^{-1})}$$

Implement using direct form II. Draw signal flow graph.

**OR**

Explain linear phase FIR filter structure. State its advantages over direct form structure.

**Q.5** Explain Bilinear Transformation method for designing IIR filter. What is frequency warping? (10)

**OR**

Explain Gibb's phenomenon. State the desirable features of window functions used in FIR filter design.

**Q.6** Compare DSP processor with general purpose processor. (10)  
State the use of DAG, Barrel shifter and MAC.

**OR**

Describe speech recognition and speech synthesis system with neat block diagram.