

Code: 9A14601

B.Tech III Year II Semester (R09) Supplementary Examinations May/June 2017

**SIGNAL PROCESSING TECHNIQUES**

(Mechatronics)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions  
All questions carry equal marks

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- 1 (a) Briefly explain about exponential and sinusoidal signals.  
(b) Draw the block diagram of DSP system and explain significance of each block.
- 2 (a) Explain briefly impulse sampling. What is the Nyquist rate and Nyquist interval?  
(b) Why do you need analog to digital converters and discuss any one type of ADC?
- 3 (a) Explain the properties of the ROC of Z transforms.  
(b) Find the inverse Z-transform of  $X(Z) = \frac{Z}{(Z+2)(Z-3)}$  when ROC is  $\{2 < |Z| < 3\}$ .
- 4 (a) State and prove the time shifting property of the DFT.  
(b) Find inverse DFT of  $X(k) = \{1, 2, 3, 4\}$ .
- 5 (a) State and prove the Parseval's relation and also give its physical interpretation.  
(b) State and prove two properties of convolution.
- 6 (a) Discuss and draw various IIR realization structures like direct form – I, parallel and cascade forms.  
(b) Obtain the cascade form realization of the given non-recursive filter.  
$$H(z) = 1 + 8z^{-1} + 21z^{-2} + 35z^{-3} + 28z^{-4} + 15z^{-5}$$
- 7 (a) Explain the impulse invariance method of deriving IIR digital filter from corresponding analog filter.  
(b) Convert the analog filter with system function given by  $H(s) = s + \frac{0.1}{(s + 0.1)^2} + 16$ , using impulse invariance method.
- 8 (a) Compare and contrast Butterworth and Chebyshev approximations.  
(b) What is a linear phase filter? What conditions are to be satisfied by the impulse response of an FIR system in order to have a linear phase?

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