

FACULTY OF INFORMATICS

B.E. 2/4 (IT) II – Semester (Supplementary) Examination, January 2015

Subject : Signals and Systems

Time : 3 hours

Max. Marks : 75

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.**PART – A (25 Marks)**

- 1 Define 'system'. 2
- 2 Define and show an example waveform for continuous time and discrete time signal. 2
- 3 For the signal $x(t)$ shown in figure (i) plot $x(t-2)$ and $x(t+1)$. 3



- 4 Distinguish between energy and power signals. 3
- 5 If $F\{x(t)\}$ is $X(W)$, find the FT of $x(t) e^{-j\omega_0 t}$. 3
- 6 Draw a discrete-time and quantized signal. What is the difference between the two signals. 3
- 7 Given $X(s) = \frac{4}{(s+1)(s-3)}$. Find $x(t)$. 3
- 8 Find the Z-transform of a^n . 2
- 9 State the properties of a system. 2
- 10 Define transfer function. 2

PART – B (50 Marks)

- 11 a) Write the trigonometric and compact cosine series representation of a periodic signal and derive the relationship between their coefficients. 8
 b) The signal $x(t) = 3 \cos 2\pi(100k)t + 4 \cos 2\pi(200k)t$
 Draw the frequency domain representation of the above signal. 2
- 12 a) Prove that the convolution in the time domain is equivalent to multiplication in the frequency domain. Wrt FT. (ie) $F\{x_1(t) x_2(t)\} = X_1(W)X_2(W)$. 5
 b) Find the FT of $e^{-\alpha t} u_s(t)$. Plot its amplitude and phase spectra. 5
- 13 a) Define sampling. 2
 b) Explain how using ADC one can obtain a quantized signal. Describe the blocks sampler, quantizer and coder. Draw the sample wave forms. 6
 c) What is zero-order hold (ZOH)? 2

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- 14 a) Distinguish between convolution and correlation. 2
b) Find the z-transform of (i) $\sqrt{(n)}$ (ii) $u_s(n)$ (iii) $(0.1)^n u_s(n) - 2^n u_s(-n-1)$ 6
c) Discuss the properties of ROC in ZT. 2
- 15 Define the following system properties. Also give few examples for each property.
i) Causal ii) linearity iii) time-invariance iv) BIBO stability 4x2.5
- 16 a) State and prove the sampling theorem for a band limited signal. 6
b) What is 'aliasing' 2
c) Compare LT and FT 2
- 17 Write notes on :
a) MATLAB applications 5
b) Transfer function and block diagram reduction 5
